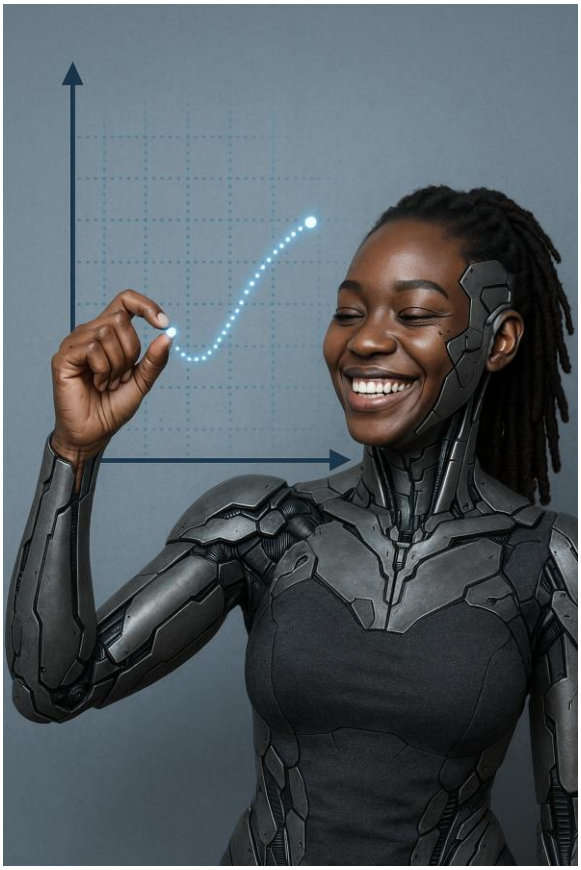
Introduction to Impossible Probability,

Statistics of Probability or

Probabilistic Statistics. VOL 3

Dr Rubén García Pedraza



Introduction to Impossible Probability,

Statistics of Probability or Probabilistic Statistics

Dr Rubén García Pedraza

2015, Revised Edition, for Print and eBook Version.

Translated into English in September 2025,

using ChatGPT, keeping the translation as faithful as possible to the original

Preliminary Words [2015 edition]

Introduction to Impossible Probability, Statistics of Probability or Probabilistic Statistics is one of those works in which a deep bond between mathematics and philosophy can be found.

It always asks about the ultimate purpose of science, wrapped in a veil of uncertainty and relativity.

There is always a halo of indeterminism, since in the end it is chance itself—the random variations of what we call reality, although we do not quite know what it is—that becomes the cause of causes.

From an interpretation not devoid of a certain nihilism, it offers a different vision of mathematics applied to statistics and probability.

The work is organized into a series of sections whose exposition unfolds in a continuous manner, each section and each paragraph being numbered in an ordered numerical sequence, in a way that facilitates reading.

Introduction to Impossible Probability first appeared in December 2011, in a limited edition of which a few copies still remain. It was later modified into a new eBook version that appeared in January 2013, whose first revision dates from January 2014. The version now presented is the latest update, based on contributions from January 2015.

To all readers, many thanks, and enjoy,
Rubén García Pedraza

Preliminary Words to the English Translation

The work presented here, *Introduction to Impossible Probability*, is essential for understanding the original meaning of the Global Artificial Intelligence. Its origins can be traced back to my writings in 2002 on Astro-ecology, the science that understands the cosmos as a single environment that must be studied from a unified, single science. In essence, this is what the Global Artificial Intelligence seeks to achieve. At the same time, in 2002 I developed the formulations of Impossible Probability, beginning in the early hours of September 11, 2001 with the *Impact of the Defect*, which was later expanded into the *Second Method* on October 16, 2002.

In essence, the entire original philosophy is based on the Cartesian idea of the necessity of a margin of doubt in any scientific proposition. This Cartesian margin of doubt would later, in the application of Karl Popper's falsificationism to inferential statistics, be understood as *critical reason*, the necessary and acceptable margin of error in any provisionally true proposition.

Impossible Probability maintains and deepens the Cartesian and Popperian rationalist tradition, enriching it with new philosophical contributions and some mathematical formulations. It rests on the understanding that the necessity of a margin of doubt in the existence of every provisional truth stems from the human limitation of being incapable of accessing the noumenon of things. It is this a priori limitation—the metaphysical limitation of the human condition—that requires humans to accept errors. Yet this does not mean that the noumenon cannot be known by other means. For this reason, in *Impossible Probability* we propose the construction of the Global Artificial Intelligence: a machine capable of making real the dream of a unified science, a single science that may lead us to the reason for all things. The creation of a global matrix, which may ultimately be resolved in a single equation, will provide the equation that solves the matrix, the very reason for everything.

Due to the special conditions in which I find myself—explained in other documents available on Internet Archive and Amazon—I am compelled to publish as quickly as I translate. For this reason, the English version of *Introduction to Impossible Probability* will be released in volumes as the translation progresses.

September 1, 2025, London, Leytonstone, 18:32

Imposiblenever@gmail.com

“What did you do with the other guys

Did people brush their teeth

In the concentration camp”

Ruben Garcia Pedraza

Poem “*Mr Saddle”*

At Stratford Library Poetry Club

Table of contents

7.Infinity

8. The tendency

9. The sample of raw scores or frequencies

7.Infinity

7.1. The possible error in infinity

7.1.1. Infinity and the origin of error

7.1.1.1. Infinity exists

7.1.1.1.1. Matter is neither created nor destroyed; there is no beginning or end—only an eternal dialectic between matter and energy, the endless successive transformations of matter into energy or energy into matter; successive cyclical processes of nth and infinite transformations between matter and form, quantity and quality; the eternal return of the universe to itself, giving rise to multiple possibilities or accidents and contingencies, each a possible option within a universe about which, in truth, *we practically know nothing—except perhaps our own ignorance* [*solo conocemos nuestros ignorancia,* we only know our ignorance], doubts, and uncertainties, from which arise humanity's and science's great transcendental questions: who are we, where do we come from, where are we going, are we alone or accompanied? Questions about a universe whose limits we do not know to begin with—or whether limits really exist at all—and where the only limits are the moral and gnoseological limits of humanity, of reason. The possibility of an infinity, full or empty, continually assails rational doubt, empirical skepticism, a possible logical nihilism in which no possibility is to be discarded in the self-movement of the Idea, because everything, within a margin of logical coherence, is possible—from the true turning out to be false to the impossible becoming inevitable—and the apparent inevitability of any given event is yet another appearance of ideology, whether the political ideology of scientific policy or the ideology of science itself—its supposed reliability. The physical possibility of an infinite universe can be studied from different options, whether factors or perspectives: from

the possibility of a universe infinite in itself—either in an infinite time in which space endures infinitely; or because, even if the universe had a chronological beginning—hypothetically the Big Bang, which quite possibly is not absolutely true—the universe expands endlessly without temporal or spatial end from the historical beginning that gave rise to it, the great explosion, the Big Bang; or else the possibility that, by the effect of gravity, the universe enters successive nth and infinite cycles [in that case the Big Bang was not really the beginning, but the consequence of an attraction process] of expansion and attraction—through the exhaustion of the energy of the original impulse, the Big Bang—new processes of gravitational attraction ensue which, once a point of maximum density and concentration of matter is reached at a particular point in space-time, lead to new collapses of matter, whether gravitational or some kind of negative entropy, giving rise to new Big Bang phenomena, from which new universes are generated, thus successively, in cyclical phenomena that would repeat successively and infinitely. Or, given that knowledge is provisional and rational truth is never absolute, if the Big Bang hypothesis were refuted, the not-to-be-ruled-out possibility could be posed again of a space-time possibly infinite in itself for having neither beginning nor end. Moreover, beyond all these hypotheses, one must mention the possibility of multiple and infinite universes parallel to our own universe, or infinite parallel universes that in turn are themselves infinite or succeed one another infinitely as a result of the expansion and attraction of the gravity of matter in each parallel universe; or the possibility of infinite hypothetical histories of our universe—whether our universe is possibly infinite, or our universe is one among those that succeed one another infinitely in the infinite cycles of expansion and attraction of matter; or the hypothesis that each of the nth infinite histories of our universe is itself an infinite history. The existence of the infinite is a hypothesis that can only be formulated theoretically, for given humanity's limited nature [human *condition*], it is not demonstrable. Although the possibility or hypothesis of the infinite is only a possibility not demonstrable empirically—a mathematical hypothesis—it constitutes a logical antinomy, a transcendental logical contradiction of critical rationalism.

7.1.1.1.2. *Infinity is a hypothesis possibly incomplete or inconsistent*: insofar as it cannot be demonstrated empirically, it is not complete; and for lack of proofs that

demonstrate it, it is possibly a hypothesis that falls into inconsistencies, as *mathematics* does. However, the fact that it has not been completed in a consistent way does not imply that it is false, since there is also no empirical proof that refutes it. In essence it is a true logical antinomy; if for that simple reason—the incompleteness or inconsistency of the hypothesis—it had to be discarded, then all of mathematics would have to be discarded. A hypothesis is discarded only when there are unquestionable proofs that refute it.

7.1.1.1.3. Infinity is a logical possibility. Given a reality, what our organic sensors generate is only a possible sample of what really occurs. Of what happens, we know only what our organic sensors show us—even if we use technological sensors to detect all kinds of *radiations*, waves, and movements of matter in space-time, it is only a sample. What those sensors show us is a sample of what really happens, because what really happens—the essential nature of matter—constitutes a pure and unknowable truth to which the human essence has no direct access, by accident or chance, a limited natural contingency.

7.1.1.1.4. At the qualitative level there are two hypotheses: either the possible universe of qualities of a reality—whether the physical universe or any other particular reality, natural or social, in any case synthetic or empirical—is a limited universe of qualities; or the possible universe of qualities—of the physical universe or any other particular reality—is a universe of infinite qualities. Again a logical antinomy arises, where neither of the two is more true or false; both will have arguments and reasoning to develop them. Nevertheless, critical rationalism will always defend the hypothesis of the infinite, since it poses a transcendental question for human experience: the possibility of *transcending the limits of experience*.

7.1.1.1.5. One of the laws of dialectics is the *transformation* of the quantitative into the qualitative and vice versa—something that is verified again in the measurement of the possible infinite qualities of a given reality. Many qualities of matter or energy vary according to the degree of intensity of the magnitude recorded in measurement; depending on the measuring magnitude, a quality can be defined in one way or another. Inasmuch as any unit of magnitude can be infinitely subdivided, there can exist infinitely many kinds of possible qualities into which any singular quality of reality can

be classified. Moreover, not only does the infinite subdivision of the unit of magnitude allow us a finer definition in the appraisal of differential qualities; as science progresses and measuring instruments offer greater precision by providing more exact measurements the deeper the resolution of measurement goes by increasing the subdivision of the unit—for example, at the beginning of the 21st century we already make measurements in nanometers, something thought impossible just a hundred years ago—science is able to study qualities that previously were not perceived. As measuring instruments advance, new qualities of natural or social reality [and technological] are discovered; thus there is the hypothesis that, if we had an infinite human history, with an infinite progress of science and an infinite progress of measuring instruments, infinitely many new unknown qualities could be discovered.

7.1.1.1.6. As science progresses, knowledge displays a greater sample of knowledge—from Galileo's telescope to today's space telescopes, to *radars*, to current microscopes capable of operating on matter at the nanotechnological level, to detection systems for waves and radiations ever more sensitive to the movements of matter and energy in space-time. As science advances, our sample of knowledge offers a larger sample of the deeper reality; and yet, possibly, it remains a minimal sample of what truly happens, because what truly happens—*the moral truth of the universe* [astro ecology]—perhaps and possibly is unknowable for the naturally limited essence of that contingency we call humanity, an accidental product of natural evolution and of the species.

7.1.1.1.7. The human being is a naturally limited essence when faced with a possible universe of infinite singular qualities.

7.1.1.2. Infinity exists—whether *qualitatively* (the qualities that are the object of knowledge) or *quantitatively* (the possible infinite units for measuring quality in a space-time infinitely divisible). However, the human being is finite [Knowledge by Application, measuring by Deduction. Categorization is qualitative, Deduction is quantitative]

7.1.1.3. The origin of error lies in the contradiction between the infinite and the finite nature or essence of the human being—hence limited. *In a finite nature there is no room for an infinite universe*.

7.1.1.4. Being finite, the human being is only capable of knowing the finite.

7.1.1.5. The human being cannot know the infinity of the universe's singular qualities.

7.1.1.6. *The contradiction between the impossibility of knowing the infinite and the finite human nature is the origin of error*; *and the error is that the human being only manages to intuit that the infinite exists, but does not know it empirically*.

7.1.1.7. The human being theoretically intuits that the infinite exists, and that intuition is a form of knowledge—that is, it is a kind of knowing. The human being knows that the infinite exists, but does not know it. This is an error in the theory of the infinite, since it is impossible to demonstrate it empirically in an absolute way, while accepting a margin of error, doubt, skepticism, within rational criticism.

7.1.1.8. The existence of the infinite is an empirical hypothesis insofar as it is *physiological*, and a theoretical hypothesis insofar as its demonstration is incomplete or inconsistent—mathematical—because the human being is an incoherent or incomplete being. Mathematics is incomplete because it reflects its producer: the human being is not entirely rational; he is a synthesis of the rational and the irrational, the conscious and the emotional; he cannot be completely logical—at most partially logical; in any case dialectical. Every human creation reflects the human condition. If mathematics is incomplete, it is because its creator, the human being, does not behave in a completely logical way; the fact that mathematics is an idea implies a nature not completely logical; it is physiological, a cerebral electrochemical synthesis. The human being is incomplete or incoherent because he is dialectical—objective and subjective, cognitive and emotional, *res cogitans* and *res extensa*; rational duality implies that he is not completely objective, because he is in part irrational, emotional, irascible, *res extensa*, subjective. Science, insofar as it is an ideology, is objectively ideological, but never completely objective. Empirical science can only reach a possible knowledge of truth by accepting skepticism and doubt, and moral responsibility in its decisions. The ***origin of error is the very human physiological limitation*** in the face of infinite reality; the only way to overcome error is through science. The language of science is mathematics.

7.1.1.9. We are continually surrounded by *particular universes* of infinite singulars: the unit is in itself infinitely divisible; the number of human beings who can exist from the

first hominid to the infinity of our species' existence, in a possible infinite human history [as long as humans learn to survive], is infinite; there exist infinitely many photons emanating from infinitely many stars in the possible infinite history of matter, and the infinite dialectical cycles of the transformation of matter into energy and vice versa. Matter and energy are neither created nor destroyed; therefore their existence can only be the infinite dialectical transformation of the state of energy into matter or matter into energy. The infinite exists, but we can only intuit it or demonstrate it incoherently or incompletely; we cannot demonstrate it empirically. The infinite is only a theoretical hypothesis that we cannot demonstrate empirically; we can only demonstrate the infinite insofar as a rational mathematical hypothesis.

7.1.1.10. The human being can only intuit or mathematically demonstrate the infinite by formulating a hypothesis: the infinite exists; an intuitive wisdom, a knowing, which nevertheless cannot be materially demonstrated, because the human being is a limited, finite being, and human physiology can only physiologically know the finite empirical. A finite existence cannot empirically know the infinite; in a universe limited to existence we can only formulate hypotheses about the infinite universe. We have only one certainty of the infinite by means of mathematics, the only possible rational dialectical logic: mathematical dialectical logic.

7.1.1.11. Mathematically, *we try to control the error arising from the contradiction between human finitude and infinite nature through the selection of information—and it is in the selection of information that we generate error, since by selecting one piece of information we discard another. By discarding information we lose information; every time we lose information we are generating error, since error is a dependent variable of the information that is lost*.

7.1.1.12. The infinite exists and, in fact, we are continually surrounded by universes of particulars of infinite singulars. The way to know the infinite is by formulating hypotheses about the behavior of the infinite. We cannot know what the behavior of all possible photons is when photons interact with an electron, because in an infinite history there will be infinite photons and infinite electrons in space-time, hence infinite interactions between photons and electrons. What we do is select a sample of interactions of photons and electrons in space-time. The sample selection of photon–

electron interaction in space-time is, then, a selection of time and a selection of space, with the error being inversely proportional to the sample itself. In the sample, only what happens in the sample happens, because for that particular sample it is impossible for something outside that particular sample to occur—and it may occur in a different sample. What is impossible for one time sample may even be inevitable in another, different time sample. What is impossible in one spatial sample may even be inevitable in another, different spatial sample. In a given sample only what happens in that given sample is possible; if something is impossible in that given sample, it is only impossible in that given sample. Something that occurs only outside a given sample is impossible to occur within that given sample—if it truly occurs only outside it; therefore that occurrence is impossible for that given sample, and may even be inevitable, that occurrence, for any other sample that does include that occurrence.

7.1.1.13. The existence of the infinite is a theoretical hypothesis, because the human being, as finite, cannot empirically know the infinite. However, the human being can formulate theoretical hypotheses about the behavior of the infinite, which can be subjected to attempted demonstration in samples; if these samples are representative, then from hypotheses accepted in representative samples it is possible to infer that they are universal hypotheses. Every inference from a sample to a universe or population is a political decision within the margin of error one is willing to accept. The first margin of error one is willing to accept is the sample selection itself; the second margin of error one is willing to accept is critical reason itself—the critical probability selected for the rational critique of the hypothesis. We cannot know how all the infinite photons and electrons in space-time behave, but we can assemble a representative sample—that is, sufficiently rational or rationally sufficient—of photons and electrons, and on the behavior of sufficiently many or rational photons and electrons, formulate a hypothesis about how the infinite photons and electrons ought to behave. If the empirical hypothesis becomes rational, and the rational hypothesis serves to explain the universe, that process of inferring a hypothesis validated in the sample in order to explain the universe is called inference: we infer a behavior in the infinite from the behavior in a sufficient finite sample.

7.1.1.14. The fact that we must assemble a sample implies that, from a universal population—in this case, an infinite one—a sample has been selected. That implies that other particular elements of that universe have been discarded, selecting only a few particular elements of that universe in order to build the sample on their singular qualities. The fact of having discarded some particulars in favor of others means that information has been lost, and in that loss of information we already generate an error. The way to control the error committed in the loss of information in the discard is by ensuring that the sample is representative—that is, sufficient.

7.1.1.15. To say that a sample is representative—that is, sufficient—implies that events have been selected at random and that the sample is of sufficient magnitude; that is, the sample is sufficiently representative of what happens in the universe from which said sample was drawn. In universes of infinite subjects or options, the sample margin of error equals the inversion of N. In universes of limited options, the sample margin of error equals the inversion of the raw scores or frequencies.

7.1.1.16. Besides controlling error by means of the inversion of the sample, there are other forms of error that we control through the selection of information. Error control is done by means of systems for the selection of information; the selection of information is a way of controlling error. Sample selection is a way of controlling error, just as, within the infinite subdivision of the unit, the selection of decimals in rational numbers is a way of controlling error.

7.1.1.17. The unit is infinitely divisible.

7.1.1.18. The inversion of the sample is established on the possibility that the sample may tend to infinity. Inasmuch as the sample may tend to infinity, the unit of the sample must be capable of being subdivided infinitely as the sample tends to infinity.

7.1.1.19. The condition of possibility for the inversion of the sample to be useful, when the sample tends to infinity, is that the unit of the sample can be infinitely subdivided. It is the infinite subdivisibility of the inversion of the sample that is the condition of possibility for the inversion of N or of the raw scores or frequencies themselves [although there are many people sceptical about the idea of infinity, in fact the value of N, natural numbers, is for sure infinite, nature itself is infinite. In essence N is mother

nature, N is Gaia. As long as there are infinite natural numbers, we can divide the unity, 1, by infinite natural numbers, N, so when N, Nature, tends to infinite, 1/N tends to Zero, Impossible Probability, it is the infinite nature where in Nature every impossible could be unavoidable, as long as there are natural/social conditions or we create the technological conditions. In Ancient Greek people do not fly, now, I can get a flight to visit The Hague at any time. In other words, things that were impossible in the past, now could be inevitable, possibility and impossibility it is just a matter of conditions, one of them time].

7.1.1.20. Every singular unit is infinitely divisible; the unit that itself forms the sample is infinitely divisible: the inversion of N in universes of infinite subjects or options; the inversion of the raw scores or frequencies in universes of limited options.

7.1.1.21. Insofar as the human being is a finite being, as finite he will tend to work with finite forms of subdivision of the unit. Moreover, given a rational number with a certain decimal sequence, the fewer the decimals, the easier it is to work with that rational number.

7.1.1.22. The selection of numbers—that is, digits, decimals—in a rational number is called truncation, and a decimal number is truncated at some point in the decimal sequence because, by shortening the decimal number, it is easier to work with that decimal; or because that decimal number may have an infinite decimal sequence. For example, if we divide the unit by three, the result will be a decimal sequence equal to a repeating decimal in threes, ad infinitum; what is usually done is to truncate the decimal sequence at some point. There are also irrational numbers with an infinite decimal character—π, for example—in which there comes a moment when we cut the decimal sequence.

7.1.1.23. Every truncation generates error, since by losing decimals we lose information.

7.1.1.24. The control of information loss in decimal truncation is achieved by truncating the decimal sequence from some less significant decimal onward. The closer decimals are to the decimal point, the more significant they are; and the farther decimals are from

the decimal point, the more insignificant they are. Thus mathematics traditionally cuts the decimal sequence at numbers distant from the decimal point.

7.1.1.25. Despite the intention in a decimal number to control truncation error by keeping only the most significant decimals, dialectically the insignificant becomes significant. That is, the consequences of information loss in the decimal cut, though they may seem slight, can in certain calculations of enormous exactitude *alter the model* with the slightest loss of information. In such models, what is done is to keep as many decimals as possible; although sometimes, in infinite sequences, there comes a point where decimals must necessarily be discarded, generating error once again.

7.1.1.26. Every loss of information—in the decimal cut and in sample selection—is the generation of error, and that *error is caused by human finitude*. The human being cannot empirically know all the decimals of an infinite decimal sequence, or one sufficiently large that reaching its last decimals is difficult; and the human being cannot know all possible cases in an infinite universe. Faced with these two problems, what science does is select a sample; in the case of decimals, it selects a significant sample of decimals before truncating the decimal sequence, selecting that significant decimal sequence; just as from the infinite universe it selects only a sample. From an infinite universe formed by infinite decimals in a rational number, it selects the most representative sample of decimals.

7.1.1.27. One way to control the error of the decimal cut in the Second Method is by means of the corrected empirical probability: the summation of the empirical probabilities according to their decimal cuts is computed, and that summation is subtracted from unity; the difference equals the total information lost due to the decimal cuts of each probability. That total information lost is averaged over N, yielding the average information lost per subject or option, and that average is added to the empirical probability of each subject or option, such that this sum equals the corrected empirical probability. The summation of the corrected empirical probabilities should then equal unity.

$p(xi) + [(1 - \sum p(xi)) : N]$ = corrected empirical probability

7.1.2. The infinite universe and the transformation of the impossible into the possible

7.1.2.1. Zero probability is the sample boundary between the possible and the impossible. Zero probability is Impossible Probability, and it is a priori impossible, in a sample, for anything whose empirical probability equals zero to be possible. Every zero probability is impossible to occur in a sample; every zero probability is Impossible Probability.

7.1.2.2. The infinite, at least as a hypothesis, exists.

7.1.2.3. We do not know the infinite with certainty, but we intuit that it exists. The infinite is a theoretical hypothesis that we cannot demonstrate empirically; we can only make mathematical demonstrations, which are incomplete. No human being truly—i.e., empirically—knows the infinite; no human being would have existential time to know the behavior of all possible photons and electrons; no human being would have existential time to know what the gravitational behavior of all the bodies in the universe is in all possible space-times. We can only come to know our space-time, but we cannot come to know every possible space-time, because at each moment we are only in one space; we cannot even physically know all space at the same time. We can only know the space of our time; we can only know a sample of space-time, a small sample of the universe—whether by telescopes or microscopes, whether of a population or a sample—but always within the *physiological limits* of what is possible for human nature.

7.1.2.3.1. We suppose that the infinite exists because we can intuit it, formulate logical mathematical hypotheses, and thus create the theoretical hypothesis of the infinite. We have the hypothesis that there are infinitely many prime numbers, and we believe that there are infinitely many primes just as we believe that the number two is the only even prime number. But obviously, if we do not know all the prime numbers, then we cannot demonstrate that two is the only even prime either; it is only a theoretical

hypothesis, since, insofar as all the prime numbers we know are odd except for the number two, we take for granted that there are no other even primes besides two. But this is only a theoretical hypothesis; no one has really demonstrated it because no one truly knows absolutely all the prime numbers, since there is the hypothesis that prime numbers are infinite, and because the human being, insofar as finite, cannot know the infinite—no one knows the infinite, at most it is intuited.

7.1.2.4. Probability is a mathematical model of prediction and description based on samples. Since we do not know the infinite, we cannot construct infinite probability models; but because probability is a model of prediction, we can make hypotheses about what may occur in the infinite—that is, by means of probability we can develop predictions, projections or forecasts, inferences, about the empirical behavior of the infinite.

7.1.2.5. In a universe of infinite particulars—subjects or options—each particular will have a set of singular qualities, each singular quality associated with a number of units of measurement, and that number of units of measurement for the singular quality of the particular will describe the raw score or frequency.

7.1.2.6. In a universe of infinite subjects or options, each particular of that infinity will have a raw score or frequency equal to the sum of the singular units of its measurement that describe some of its qualities.

7.1.2.7. If we have infinitely many particulars, and each particular has a raw score or frequency different from zero, this must mean that, insofar as each particular has a different raw score or frequency, it must be expressible in some way—that is, each particular must have a probability of occurrence insofar as it has a raw score or frequency different from zero.

7.1.2.8. In a model of infinite particulars, every particular that has a raw score or a frequency different from zero is empirically a possible particular.

7.1.2.9. However, a particular that has a raw score or frequency different from zero, when that score or frequency is divided by the infinity of possible singularities, yields an empirical probability that is an infinite sequence of decimal zeros; insofar as it is

infinite, there comes a point where it is necessary to truncate the decimal sequence at some of its zeros, giving rise to probability zero—Impossible Probability.

$p(xi) = (X \neq 0) : \infty = 0.000000000000000000000000000.....0 = 0$

7.1.2.10. In theory, normally, every subject or option with a raw score or frequency different from zero is a possible subject or option, and its possibility will, in theory and normally, be associated with a non-zero empirical probability in a sample situation.

7.1.2.11. The infinite is a normal hypothesis: the infinite nature of π; the infinite subdivision of the unit; the existence of infinitely many integers; or the possibility of infinitely many atoms or photons—whether in a possible infinite natural history, or in infinite histories of the universe, or in infinite parallel universes, or in the possible infinite succession of universes as matter enters successive processes of expansion and contraction, in what could be an infinite sequence of successive Big Bangs by the effect of gravitational attraction once each expansion process generated by each Big Bang is exhausted—in sum, whatever the reason, the infinite is a normal hypothesis.

7.1.2.12. In a model of infinite subjects or options, where the universe of subjects or options tends to infinity, the empirical probabilities of all the subjects or options would be transformed into Impossible Probability, if in computing the infinite empirical probabilities we take into account the infinite raw scores or frequencies. This would yield the logical contradiction that something that was once possible is transformed into the impossible and yet has occurred, in the dialectical transformation of the possible into the impossible to the same extent as the impossible into the possible—thus producing the dialectical identity between the possible and the impossible on a factual error equal to zero—which would negate all causal determination, thus likewise producing a full identity between determinism and stochastic indeterminacy by chance, as well as the dialectical identity between everything and nothing, insofar as everything infinite in probabilistic terms becomes nothing and nothing would likewise be everything. This is dialectical logic applied to the statistics of probability, or statistical probability.

7.1.2.13. Now then, if theoretically in an infinite universe—even the impossible—is in theory possible, in practice only that which has logical coherence actually occurs; and logical coherence depends on the scientific-technological capacity acquired through humanity's progress and on the political definition of truth and ideals. What is possible is what scientific policy affirms to be possible—that is, scientifically and technologically possible—or what is of political interest. *What has been defined as possible or impossible in each historical epoch has depended both on factors of scientific-technological development and on political variables*.

7.1.2.14. What occurs in an infinite universe occurs only—and absolutely only—in an infinite universe.

7.1.2.15. What occurs in an infinite universe need not be morally true for a limited universe.

7.1.2.16. What holds for infinite universes is not always valid for limited universes.

7.1.2.17. In universes limited by a predetermined model of options—a predetermined model of existence—i.e., universes of limited options, only what happens to the predetermined existing options is morally true.

7.1.2.18. Limited universes are limited to options. In a universe limited to options, perhaps the frequencies are infinite; in a universe limited to options, perhaps the raw scores are infinite; but whether the frequencies are infinite or the raw scores are infinite, in a universe limited to options the limits of the universe are the existing options; in a limited universe the existing options limit the universe—it is a universe limited to predetermined forms of existence.

7.1.2.19. If I flip a coin infinitely many times, logically, the normal outcome—under equality of opportunity—will be that the probability of heads or tails is identical to the reciprocal of N.

7.1.2.20. If I roll the same six-sided dice infinitely many times, the normal outcome—under equality of opportunity—will be that the probability of any number from one to six is identical to the inversion of N.

7.1.2.21. Only—and absolutely only—in truly infinite universes, infinite in all their dimensions, universes of infinite subjects or options, is the impossible theoretically identical to the inevitable; although in practice everything depends on the logical coherence of what may occur, on the current or potential existence of events that, although perhaps we cannot even imagine now, have their possibility of occurrence latent within the margin of error—factual or rational—where there is always room for doubt that the true may be false and the impossible inevitable.

8.Tendency

8.1. **Tendency, and the ideal tendency**

8.1.1. Tendency is behavior—the way of being.

8.1.2. The ideal way of being depends on the object of study. The ideal behavior in a study of equality of opportunity should be similar to the inversion of N, within the percentage of error accepted by critical reason. The ideal behavior in a study of positive bias—of ideal options—should be greater than the inversion of N, within the percentage of error accepted by critical reason. The ideal behavior in a study of negative bias should be less than the inversion of N, within the percentage of error accepted by critical reason.

8.1.3. The ideal tendency is that model of behavior *aimed* at rationally realizing an ideal [Global Project System]; what will never be ideal is a way of being that lacks a sufficient ideal. Mathematics is the idealization of reality for the realization of the ideal; the critical reason accepted by scientific policy sets the limits of rational sufficiency for a way of being to be truly ideal. Ideological politics determines the ideological ideals of scientific policy.

8.1.4. In the study of error, “sufficiently rational” is a way of being equal to or less than critical reason; in the study of reliability, “sufficiently rational” is a way of being equal to or greater than critical reason.

8.1.5. Ideal tendency is, in essence, any model of behavior that is sufficiently rational.

8.1.6. In any case, even if critical reason accepted only zero percent error—one hundred percent reliability—every rational acceptance will be sufficiently rational within the margin of error of sample representativeness: the inversion of the sample.

8.1.7. Whenever critical reason does not accept zero percent error—one hundred percent reliability—every sufficiently rational tendency will be rationally sufficient within two margins of error: the margin of error of sample representativeness and the percentage of error accepted by scientific policy.

8.1.8. Every acceptance of a possible error, in sufficient or infinite time, is inevitable. Therefore, everything rational is rationally relative to time—provisional. The smaller the margin of error, the greater the probability that provisional truth will endure over time. The larger the margin of error, the smaller the probability that provisional truth will endure over time. To accept a margin of error is to accept a margin of empirical skepticism or rational doubt—moral responsibility. A margin of skepticism or doubt is the margin within which the accepted proposition—sufficiently rational—will inevitably, in rational or necessary time, once again become the object of rational critique, after the provisional period of acceptance has elapsed, to be inevitably rejected on account of the possible error.

8.1.9. To accept a margin of empirical skepticism in every proposition implies accepting a margin of negation in the sufficiently rational proposition; if in absolutely every **causal *attribution*** a margin of skepticism is accepted, what is in fact being called into question is the very idea of cause.

8.1.10. Rationally, accepting a margin of rational doubt in every proposition implies accepting the possibility that the proposition itself is incomplete or incoherent; every incoherence implies logical and moral incoherence.

8.1.11. A limited, incomplete, or incoherent being—subject to error—cannot formulate absolutely complete or coherent universal maxims; it is a synthesis of objectivity and subjectivity, and therefore cannot be absolutely coherent for the same reason it is not absolutely objective. It is only partially objective, being partly subjective; it can be objective or coherent—logical—only incompletely, partially, in that proportional part that behaves provisionally in an objective way, because not every time or place is

objective; in part, life is pure subjectivity. Objectivity is accepted only within a margin of error in which perhaps ***everything is really subjective—physiological, a product of the brain***. ***Objectivity and subjectivity are identical insofar as both are brain products***; the margin of error between objectivity and subjectivity is the set of error margins accepted by scientific policy. Every universal maxim must necessarily be relatively coherent or complete—provisional: universal insofar as it is accepted as a model of universal explanation or understanding; provisional insofar as it may turn out to be pure appearance when the time comes for moral responsibility to be necessary. Every universal maxim is accepted provisionally—coherently or completely—within a margin of error, a margin within which it may be logically and morally incomplete or incoherent.

8.1.12. Statistics is the study of that which is stochastic—random—the behaviour of chance in space-time, history; probability is the study of what happens, and what happens is the occurrence: a succession of facts that are in themselves positive, sufficiently transcendent beyond themselves to be historical. The fact: in itself positive, beyond itself transcendent, for itself historical—three logical moments of the same dialectical process: what happens in the history of chance, or the chance of history.

8.1.13. If mathematics is incomplete, then every mathematical model—from Pythagoras, Euclid, and Archimedes to Copernicus, Galileo, Descartes, Newton, Planck, Einstein, and Feynman—rests upon possible inconsistencies. Something that cannot demonstrate its own consistency completely may be inconsistent—error, logical and moral incoherence. To accept that an idea is isomorphic, to accept that a measurement is isomorphic, to accept that something distinct from anything else can be identical to something else—that an idea can be identical to a reality, that the subjective can be objective, that a measurement can be identical to a quality—logically entails a dialectically necessary error; rational critique proves inevitable. Every mathematical product is in itself a model of rational doubt about what reality really is; mathematics, as an idealization of reality, is an idea which, within a margin of error, is not isomorphic. Skepticism becomes pure objectivity: we only know that we truly know nothing about reality itself [we only know our ignorance]; it is in the realization of the ideal that existence proves itself.

8.1.14. In sum, tendency is the mathematical form of the movement or transformation of substance, within the dialectically necessary logical error we are willing to accept. Logical error is the identity of opposites: statistically, the inversion of the sample; rationally, the same critical reason. Even if critical reason accepted zero percent error—one hundred percent reliability—every sufficiently rational proposition would inevitably be a proposition at the mercy of chance within the margin of error of sample representativeness. Every rational proposition, once the provisional period of acceptance has elapsed—proportional to the margin of error—will inevitably prove to be a product of chance.

8.2. The analytical method of Impossible Probability is the syllogism of tendency.

8.3. The syllogism of tendency is defined thus: if A tends to be B, and B tends to be C, then A tends to be C. A's tendency to be B, and A's tendency to be C, depends on A's capacity to be A and A's capacity to cease being A in order to become B in the first place—and even to become C.

8.4. The proposition "A equals A and A does not equal A, because A can be equal to B or C" is a logically logical incoherence, necessarily dialectical; the logical error of identity is necessarily dialectical. ***In infinite universes, the inversion of N is at once central tendency and inversion dispersion***. In limited models, as N is limited, the ***inversion of N in two-option models tends to be at once the central tendency and the greatest empirical dispersion of the sample—<u>the opposites are identical because they are opposites.</u>***

8.5. Dialectic is essentially the movement of material substances—the movement of ideas; dialectic is, in essence, the idea of movement. Movement is the way in which being-in-itself makes what is outside itself into something for itself. The idea of movement is the dialectical idea; matter is ideally dialectical, and the idea materially dialectical. Within Impossible Probability, different levels of tendency will be observed: individual tendency, sample tendency, and universal tendency—and within the universal tendency, reference must be made to infinite tendency.

8.6. Individual tendency

8.6.1. Individual tendency is the being's tendency to be *particular*—the tendency of being to realize itself concretely in real, objective, concrete reality. The being in the sample tends to show itself as what it is; its particular realization in real reality is, qualitatively, its tendency to be what its own particularity truly is; quantitatively, its quantitative tendency is manifested in the singular magnitude of its particular quality to be what it is. The singular magnitude of its particular quality is the raw score or frequency.

8.6.2. The quotient of the singular magnitude of its particular quality—raw score or frequency—by the sum of all the singular magnitudes in the entire sample—the sum of all raw scores or frequencies—is equal to the empirical probability of the subject or option. For raw scores or frequencies with negative sign, compute sums and empirical probability on the absolute value.

8.6.3. The empirical probability of a subject or option forecasts and *projects* a prediction of the individual tendency of the individual being.

8.6.4. Empirical probability, as a percentage (if multiplied by one hundred), is the description of the individual tendency; it *describes the individual behaviour* in relation to the whole sample, preserving a proportionality between the individual behaviour—the way its being shows itself *in the sample*—in relation to the sample itself.

8.6.5. *A sample of subjects or options* is a sample of subjects or options because it is where each subject or option shows itself as what it is—*individual tendency* in the sample of its being, the way of showing itself as what it is.

8.6.6. An empirical probability, insofar as it shows the being as what it is, has predictive value, since empirical probability is in itself the quantitative value of the tendency of being to be. Empirical probability allows *predictions to be made about what the future tendency of the being* will be: in the future, the being's future tendency will probably be the behaviour that the being shows in the sample itself—the way the being shows itself in the sample is the sample of what it truly is.

8.6.7. The empirical probability of a subject or option will be equal to the empirical tendency demonstrated by that subject or option.

8.6.8. One of the features of Impossible Probability is that for every real empirical behaviour there is, in contrast, an ideal theoretical behaviour.

8.6.9. Impossible Probability, as dialectic, establishes for every real element an ideal element; before everything empirical there is always a theoretical ideal. The theoretically ideal is what ought to be ideal for theoretical behaviour under given conditions.

8.6.10. The ideal under equality of opportunity is to tend toward a normally normal distribution equal to or below the bias margin accepted by critical reason.

8.6.11. The ideal of ideal options is to tend toward positive bias equal to or above a reliable bias value accepted by critical reason.

8.6.12. The ideal of non-ideal options—or those ideal options by being the minimum—is to tend toward negative bias equal to or above a reliable bias value accepted by critical reason.

8.6.13. In any kind of universe—always and absolutely always—whether a universe of infinite subjects or options or a universe of limited options, the inversion of N will always fulfil the dual function of being, at the same time, the central tendency (arithmetic mean) and the probability of occurrence at random under equality of opportunity.

1/N = arithmetic mean and probability of random equality of opportunity

8.6.14. In studies of equality of opportunity, the normal case will be for the tendency of subjects or options to tend toward empirical probabilities similar to the inversion of N. What is normal under equality of opportunity should *match* theoretical behaviour under equality of opportunity—free and random—the tendency of behaviour toward the inversion of N, in every kind of universe, whether of infinite subjects or options or of limited options. For every possible kind of universe, the inversion of N is the statistical norm: arithmetic mean and behaviour under equality of opportunity—chance.

8.6.15. In studies of bias, the normal case will be for the tendency of subjects or options to be for their empirical probabilities to become as different as possible from the

reciprocal of N. The norm in the study of biases must be differential behaviour: the tendency of empirical probability must be to diverge from the inversion of N. In studies of growth of ideal options—through an increase in positive bias—the empirical probability should be as high as possible. In studies of decrease—through an increase in negative bias for non-ideal options, or for ideal options by being the minimum—the empirical probability should be as low as possible. The object of study determines the universal and individual ought-to-be, because everything ought to be rationally ideal. The object of study determines the ought-to-be; depending on the object, each object must be different.

8.6.16. The fact that the arithmetic mean is a theoretical probability equal to the inversion of N, in any kind of universe, will logically imply the absence of any empirical value of central tendency. To resolve this problem, as will be seen below, Impossible Probability creates a variety of empirical forms for studying empirical central tendency.

8.6.17. In Impossible Probability there are different ways to solve the problem of the absence of empirical centrality, since the reciprocal of N is a theoretical value. One way to resolve the problem—the vacuum of empirical centrality in Impossible Probability—is to take as an acceptable empirical element of central tendency the subject or option that has the normal Similarity Level of the subject or option closest to zero, or the normal Bias Level closest to zero. One way to study the central tendency of the sample is by studying the behaviour of that subject or option which has the greatest similarity to the inversion of N and the smallest possible bias in the sample. This subject or option will be called, as a standard, the subject or option closest to the inversion of N, and it will be denoted by the following symbol: “p(xi≈)”.

p(xi≈) = subject or option closest to the reciprocal of N

8.6.18. If the subject or option with the smallest possible bias and the greatest possible similarity to the reciprocal of N is given special study—inasmuch as it is a possible means of studying the sample’s empirical central tendency—then another way to study

the tendency of the sample is the dispersion tendency of the subjects or options most distant from the reciprocal of N.

8.6.19. The subject or option with the greatest positive normal Bias Level of the subject or option—the subject or option with the greatest empirical probability—will be called the maximum empirical probability, or simply “the maximum,” and will be denoted with the following symbol “p(xi+)”, which will symbolize maximum empirical probability.

p(xi+) = maximum empirical probability, “the maximum”

8.6.20. The subject or option with the greatest negative normal Bias Level of the subject or option—the subject or option with the smallest empirical probability—will be called the minimum empirical probability, or simply “the minimum,” and will be denoted with the following symbol “p(xi-)”, which will symbolize minimum empirical probability.

p(xi-) = minimum empirical probability, “the minimum”

8.6.21. If the maximum probability is the sample maximum, and the minimum probability is the sample minimum, then, necessarily, from the average of both—the maximum and the minimum—another fundamental concept of Impossible Probability must arise: a new statistic of individual tendency, the probability intermediate between the maximum and the minimum, equal to dividing by two the sum of the maximum and the minimum probability. The intermediate empirical probability is represented by the following symbol “p(xi+/-)”: intermediate probability or intermediate empirical probability, or simply: the intermediate.

p(xi+/-) = (p(xi+) + p(xi-)) : 2 = intermediate (empirical) probability, “the intermediate”

8.7. **Sample tendency**

8.7.1. Sample tendency is the tendency of the sample of magnitudes.

8.7.2. Sample tendency was studied by classical or conventional statistics—the First Method—with Gauss perhaps an important mathematician in this regard for the study of sample tendency, since by means of the Gaussian bell curve it is established that, under normal conditions, the normal tendency of the sample is to tend toward normality—absence of bias—the arithmetic mean.

8.7.3. The way to study sample tendency in the Second Method is completely different from that of the First Method—classical or conventional mathematics. To understand the mathematical origin of the study of tendency, I will first refer to the study of tendency in the First Method—classical or conventional statistics—and then advance the concept of tendency in the Second Method of Impossible Probability.

8.7.3.1. Classical or conventional statistics—what will be called the First Method—based the study of tendency on the differentiation between central tendency and dispersion tendency.

8.7.3.2. Central tendency, for conventional statistics, is described by the concepts of arithmetic mean, mode, and median.

8.7.3.2.1. For classical or conventional statistics, the arithmetic mean is the average of the sum of the sample’s values.

8.7.3.2.2. The mode is that quantitative value that shows the greatest frequency—where the greatest possible frequency is concentrated. What, in a frequency study for the First Method, is central tendency would, in Impossible Probability, be the statistic of greatest positive bias of the frequency—the maximum empirical probability of the frequency, that is, the maximum “p(xi+)”. In the Second Method, central tendency and dispersion are identical because they are opposites: in a frequency study, the subject

or option with the greatest frequency will be taken as the model of central tendency (mode) at the same time that it is the model of greatest positive dispersion of the individual frequency—greatest positive bias of the frequency—maximum empirical probability, or simply "the maximum," in a frequency study.

8.7.3.2.3. The median is that quantitative value that holds the fiftieth percentile of the sample's values—that is, the value with fifty percent of relative frequencies below it and fifty percent above it.

8.7.3.2.4. The concept in classical or conventional statistics most similar to the Second Method's concept of empirical probability of a subject or option—according to the equations of October 16, 2002—is the concept of relative frequency. The empirical probability of a subject or option is the quotient of that subject's or option's raw score or frequency by the sum of the raw scores or frequencies in the sample of subjects or options. The definition of empirical probability of a subject or option is a logical consequence derived from the definition of the sample N subjects or options—whether in universes of infinite subjects or options or in universes of limited options; that is, in truly infinite universes or universes limited to predetermined existences.

8.7.3.2.5. The difference between the empirical probability of subject or option in the Second Method and the relative frequency of classical or conventional statistics—the First Method—is that the First Method, classical or conventional statistics, does not take into account the value of the inversion of N, insofar as for the First Method the value N equals the sum of the frequencies. Whereas for Impossible Probability, in universes of infinite subjects or options, N is N subjects or N options; and in universes of limited options, N is N options. The true innovation that Impossible Probability introduces into the study of what happens—probability—in the history of chance—statistics—is the reconceptualization of N insofar as N can be N subjects or N options: the introduction of the subject–object dialectic into mathematics. The true significance of Impossible Probability is to be a mathematical dialectical logical application; in Impossible Probability the inversion of N is an essential element of the theory itself.

8.7.3.3. Dispersion tendency in the First Method—classical or conventional statistics.

8.7.3.3.1. For classical or conventional statistics, dispersion tendency is measured by the differential score, the Mean Deviation, the Variance, and the Standard Deviation, as well as by the Standard Score.

8.7.3.3.2. The differential score is the difference between each individual quantitative value and the arithmetic mean.

8.7.3.3.3. The Mean Deviation is the average of the sum of the absolute values of each differential score.

8.7.3.3.4. The Variance is the average of the sum of the squared differential scores.

8.7.3.3.5. The Standard Deviation is the square root of the Variance.

8.7.3.3.6. The Standard Score is the quotient of the differential score by the Standard Deviation.

8.7.3.3.7. The normal tendency, in the Gaussian bell curve, is for all individual elements of the sample to arrange themselves around the Standard Score of zero, with the Standard Score of zero equal to the Standard Score of the arithmetic mean.

8.7.3.3.8. Gauss establishes, by means of his bell curve, that normally the sample will tend toward the arithmetic mean. As the sample size increases, the sample's normal tendency toward the arithmetic mean—the statistical norm—will be greater.

8.7.3.4. Sample tendency in the Second Method.

8.7.3.4.1. In the Second Method every sample tendency can be a theoretical tendency or an empirical tendency; first the theoretical tendency will be presented.

8.7.3.4.1.1. **The theoretical tendency**

8.7.3.4.1.1.1. Within the theoretical sample tendency, the most important, in universes of infinite subjects or options, will be the inversion of N. In universes of infinite subjects or options, the inversion of N—besides being the arithmetic mean and the theoretical probability of equality of opportunity—will perform additional functions.

8.7.3.4.1.1.1.1. In universes of infinite subjects or options, the inversion of N is also, at the same time, the probability of sampling representativeness error. If a larger sample

means greater representativeness, then a smaller sample means less representativeness. Therefore, in universes of infinite subjects or options, the probability of sampling representativeness error is inversely proportional to N; thus, in such universes, the inversion of N equals the probability of sampling representativeness error.

1/N = probability of sampling representativeness error

8.7.3.4.1.1.1.2. If, in universes of infinite subjects or options, the inversion of N is the probability of sampling representativeness error, then Theoretical Reliability, in universes of infinite subjects or options, will equal unity minus the reciprocal of N.

1 – 1/N = Theoretical Reliability in infinite universes

8.7.3.4.1.1.1.3. In universes of infinite subjects or options. If the greater the N, the greater the normal tendency toward the arithmetic mean, and if the smaller the N, the lesser the tendency toward the arithmetic mean, then the greater the N, the smaller the dispersion or deviation in the sample; and the smaller the N, the greater the dispersion or deviation in the sample. In other words: the greater the N, the lower the probability of bias; the smaller the N, the higher the probability of bias. Therefore, theoretically, as a function of the sample, the probability of bias is equal to the inversion of N; hence, in universes of infinite subjects or options, the inversion of N is, at the same time, the probability of theoretical bias—or the probability of theoretical dispersion or deviation.

1/N = probability of theoretical bias (i.e., theoretical dispersion or deviation) in universes of infinite subjects or options

8.7.3.4.1.1.1.4. Moreover, it must be noted that in universes of limited options, as the options become more constrained—as in a two-option model—the inversion of N will at the same time be the greatest Mean or Standard Deviation. For this reason, as a model tends to limit its N options, the inversion of N loses objectivity as a reliable theoretical dispersion measure, tending instead to be the greatest Mean or Standard Deviation. As options become limited, the inversion of N is less objective for estimating representativeness error or theoretical bias; for this purpose, in models of limited options, the inversion of the raw scores or frequencies is more objective.

8.7.3.4.1.1.2. **The inversion of the raw scores or frequencies**

8.7.3.4.1.1.2.1. The inversion of N is, universally—for every kind of universe—the tendency to equality of opportunity at random, the statistical norm, and the arithmetic mean of empirical probabilities. Both in universes of infinite subjects or options and in universes of limited options, the inversion of N is, at the same time, the arithmetic mean and the theoretical probability of occurrence at random under equality of opportunity.

8.7.3.4.1.1.2.2. However, in universes of limited options, the inversion of N does not serve as the probability of theoretical dispersion, nor as the probability of sampling representativeness error. In universes of limited options, this function is carried out by the inversion of the raw scores or frequencies—i.e., the random bias margin, or theoretical oscillation error around the central tendency. In universes of limited options, the inversion of the raw scores or frequencies is also the probability of sampling representativeness error. Thus the multifunctionality of the inversion of the raw scores or frequencies can be summarized as follows, in universes limited to predetermined existences:

8.7.3.4.1.1.2.2.1. In universes of limited options, the inversion of the raw scores or frequencies is the probability of theoretical deviation or dispersion—the probability of

theoretical bias.

1/∑xi = probability of theoretical dispersion or deviation in universes of limited options

8.7.3.4.1.1.2.2.2. In universes of limited options, the inversion of the raw scores or frequencies is the probability of sampling representativeness error.

1/∑xi = probability of representativeness error in universes of limited options

8.7.3.4.1.1.3. **Critical probability**

8.7.3.4.1.1.3.1. Critical probability is the ideal of critical reason.

8.7.3.4.1.1.3.2. Every quotient is in itself a ratio; therefore every probability is a ratio. If a rational quotient has a critical function—as a ratio—then that rational quotient will be a *critical ratio*. If critical probability is a critical rational quotient, then critical probability is a critical ratio, denoted "p(xc)". In essence, critical probability will truly be critical insofar as it is the ideal critical ratio. The ideal of critical reason will be determined by scientific policy regarding the ideal percentages—of error or reliability—one is willing to accept in the political theory of science, either as a function of the unit of a given quotient, or as a function of a maximal or ideal tendency by which the percentage X, of error or reliability, is scaled (e.g., divided by one hundred).

p(xc) = critical probability

8.7.3.4.1.1.3.3. Scientific policy decides the critical probability for the testing of ideas, in logical coherence with the ideals of the political theory of scientific policy. Critical probability will result from a percentage X of error or reliability (over one hundred), multiplied by a maximal or ideal tendency, or applied to the unit of a quotient. In studies of error, the percentage X of error should be equal or close to zero percent error. In

studies of reliability, the percentage X of reliability should be equal or close to one hundred percent reliability. The percentage X will, in essence, be a dependent variable of the moral demand for truth made by the political theory of science—ideology.

8.7.3.4.1.1.3.4. Normally, in reliability studies, the greater the tendency toward an X equal to one hundred percent morally reliable—in the moral variable X—the greater the moral coherence in truth.

8.7.3.4.1.1.3.5. Normally, in error studies, the greater the tendency toward an X equal to zero percent moral error—in the moral variable X—the greater the moral coherence in truth.

8.7.3.4.1.1.3.6. In studies of error, the percentage of moral reliability is one hundred minus the percentage X of error; in studies of reliability, the percentage of moral reliability is the percentage X of reliability.

8.7.3.4.1.1.3.7. So that critical probability is moral, scientific policy must set the critical probability in the most rational way, so as to be sufficiently ideal; only zero or positive historical tendencies of critical reason—transcendental in space-time—will be accepted. The moral, the rational, and the ideal are three logical moments of the same dialectical process: critical reason. The positive fact, the transcendent fact, and the historical fact are three logical moments of the same dialectical process: what happens.

8.7.3.4.1.1.3.8. Every scientific–political decision to accept or reject a hypothesis is taken while accepting a possible margin of error in the decision itself. The first margin of error that is accepted is the inversion of the sample: in universes of infinite subjects or options, the inversion of N; in universes of limited options, the inversion of the raw scores or frequencies. And, as already noted in earlier sections, in universes of limited options, when the ideal were a sample of zeros, the sample of raw scores or frequencies would itself be the error. The second margin of error is that derived from critical reason—either the acceptance of the percentage X of error directly in error studies, or, in reliability studies, one hundred minus the percentage X of reliability. If the sufficiency of the tendency is decided on the basis of a critical probability, the critical probability is the *critical ratio* that critiques the sufficiency of the tendency. Every critique of the

sufficiency of a tendency must be sufficiently logical or ethical—critical. Scientific policy is what determines, in scientific practice, the rational critical sufficiency of critical reason insofar as possible. In every critical probability, X is a moral–ideological variable.

8.7.3.4.1.2. **Synthesis of the theoretical tendency** 122

8.7.3.4.1.2.1. In any kind of universe—of infinite subjects or options, or of limited options—the inversion of N will at once be the central tendency and the theoretical probability of randomness under equality of opportunity.

8.7.3.4.1.2.2. In universes of infinite subjects or options, the inversion of N is at the same time the probability of sampling representativeness error and the probability of theoretical dispersion—*theoretical bias*—therefore it will be the random bias margin of the sample's magnitude, or the theoretical oscillation error around the central tendency.

8.7.3.4.1.2.3. In universes of limited options, the inversion of the raw scores or frequencies is, at the same time, the probability of theoretical dispersion—*theoretical bias* or theoretical oscillation error around the central tendency—and the probability of sampling representativeness error. If, in a universe of limited options, the number of options can behave similarly to a universe of infinite subjects or options—for example, limited universes of discrete categories—one may, although it is a universe of limited options, treat it as if it were a universe of infinite subjects or options; or one may measure the theoretical relation of the variables as a function of the variations between N and the raw scores or frequencies by means of ***Theoretical Flexibility*** (N over raw scores or frequencies) [flexibility is just the opposite to arithmetic mean].

8.7.3.4.1.2.4. Owing to the very multifunctional definition of the inversion of N, in Impossible Probability the contrast between central tendency and dispersion—being identical—becomes a contrast between empirical tendency and critical tendency: the true contrast of ideas for inferring from the sample to the universe, upon which the isomorphism between idea and reality is established, to explain—politically, partially—reality itself, within a margin of uncertainty.

8.7.3.4.2. **Empirical sample tendency**

8.7.3.4.2.1. Mean or Standard Deviation, “DMoS”

8.7.3.4.2.1.1. In Impossible Probability, the empirical sample tendency is that which stands opposed to the theoretical sample tendency.

8.7.3.4.2.1.2. In Impossible Probability the true contrast is the contrast between the empirical idea and the critical idea: the theoretical idea of the sample is the inversion of the sample; the theoretical–critical idea is the critical ratio; and every critical probability is theoretical insofar as scientific policy establishes the critical ratio on the political theory of science.

8.7.3.4.2.1.3. If the theoretical tendency of the sample is the inversion of the sample—be it the sample N in universes of infinite subjects or options, or the reciprocal of the sample of raw scores or frequencies in universes of limited options—the empirical tendency of the sample will be the Mean or Standard Deviation (“DMoS”). In Impossible Probability one may always choose, interchangeably (adapting calculations if necessary), Mean Deviation or Standard Deviation, denoted “DMoS”. Even so, since the first phase, Mean Deviation—the Average Bias Level—has always had priority in Impossible Probability. It should be scientific policy that decides which to use in tests: Mean Deviation or Standard Deviation.

8.7.3.4.2.1.4. If the inversion of the sample—be it sample N in universes of infinite subjects or options, or be it the sample of raw scores or frequencies in universes of limited options—is the theoretical sample tendency, and the inversion of the sample is the *theoretical* random bias margin, then the Mean Deviation is the *empirical* random bias margin.

DMoS = empirical random bias margin (margin of bias by empirical chance)

8.7.3.4.2.1.5. Mean Deviation equals Total Bias (the sum of the absolute values of the Bias Levels with respect to the inversion of N) multiplied by the inversion of N; that is, Mean Deviation is the Average Bias Level by chance. Mean Deviation is the central

tendency of the bias explained by chance—the distribution of Total Bias by chance—where the normal Bias Levels are the differential between empirical and theoretical probability, for any possible kind of universe—of infinite subjects or options, or of limited options.

DM = Average Bias Level by chance

8.7.3.4.2.1.6. Centrality and dispersion are identical because they are opposites—within the margin of error one is willing to accept. In sum, Mean Deviation is the central tendency of the sample's empirical dispersion—therefore, at the same time, central tendency and dispersion—within the empirical error margin that is accepted: sample dispersion over maximum sample dispersion in the First Mode of Empirical Error if the *aim* is to reduce dispersion to zero; one minus the quotient of sample dispersion over maximum sample dispersion in the Second Mode of Empirical Error if the aim is to tend toward maximum dispersion; and the quotient obtained by dividing by the ideal dispersion the absolute value of (sample dispersion minus ideal dispersion) in the Third Mode of Empirical Error for omega studies.

8.7.3.4.2.1.7. Mean Deviation is the margin of bias by empirical chance—or the Average Bias Level by chance—because it equals that portion of Total Bias explained by the reciprocal of N. If Total Bias is the entirety of all bias, then the product of the inversion of N and total bias equals the proportional share of Total Bias explained by the inversion of N—that is, that part of Total Bias explained by free will under equality of opportunity—chance. Therefore, Mean Deviation is at once empirical bias and empirical chance.

$\sum / (p(xi) - 1/N) / \cdot 1/N$ = distribution of Total Bias by chance

8.7.3.4.2.1.8. Since classical or conventional statistics usually prefers to square the differential scores (called normal Bias Levels in the Second Method), with the average of the squared differentials being the Variance and the square root of the Variance being

the Standard Deviation, Impossible Probability will normally allow one to select Mean or Standard Deviation via the symbol DMoS, which denotes the Mean or Standard Deviation of the empirical probabilities.

8.8.1.3. *The nature of empirical knowledge is, then, to be physiological in nature*. Any kind of logical premise, or any kind of prior information from which any hypothesis may be deduced, are physiological premises or prior pieces of information insofar as they are processed physiologically. The ultimate origin of all empirical knowledge is physiological in nature, being structured in neurons and synaptic communication.

8.8.1.4. Every hypothesis physiologically deduced from our prior physiological premises or prior physiological information—that is, every empirical hypothesis deduced from empirical premises or empirical information—is an *empirical hypothesis by virtue of being empirically physiological* in nature [by Application, categories, and by Deduction, data, is no other thing but the replication of human physiology, what we do not know yet is what kind of developments in artificial psychology GAI can experience as soon as it surpass human intelligence up to the point to develop non human pure operations. If Gaia is able to achieve that point, Gaia should be able to modify its human replication physiology, and Gaia could develop Real Intelligence beyond the replication of our human physiology, the transformation of its own global program by itself] .

8.8.1.5. Science tends to know truth through the hypothetico-deductive method, which establishes objective reality in the contrast between empirical hypotheses and real reality. A hypothesis deduced from empirical premises or information is necessarily an empirical hypothesis.

8.8.1.6. In probability—the study of what happens—statistics, the history of chance—the way we rationally, critically test the sufficiency of an empirical hypothesis, in order to decide whether to accept it, is by critiquing the objective sufficiency of the tendency on the basis of a critical ratio: a rational critique of the sample's tendency to provisionally demonstrate the truth of the empirical hypothesis, according to whether it is or is not sufficient to constitute a provisional truth.

8.8.1.7. If an empirical hypothesis is sufficiently objective under rational critique—normally yielding a zero or positive result in the critical-reason contrast—scientific

policy accepts the empirical hypothesis, and it is provisionally transformed, within a margin of error, into a rational hypothesis, becoming part of objective science—the objective reality of science.

8.8.1.8. A hypothetical empirical tendency of what happens, in a sample, will then provisionally be a rational hypothesis if the empirical tendency of what happens in the sample—explained by the empirical hypothesis—is accepted by critical reason.

8.8.1.9. Rational critique assesses the tendency of the sample selected to demonstrate the empirical hypothesis by setting margins or percentages of error within which to accept whether the empirical hypothesis's tendency is sufficiently rational to be a provisional part of objective science.

8.8.1.10. An empirical hypothesis will tend to demonstrate the reliability and validity of its idea in itself—its own propositional linguistic structure—by showing that the tendency observed in the sample is a sufficient, objective sample for what the hypothesis asserts to be true, at least provisionally or historically—relatively speaking.

8.8.1.11. The way the hypothesis will show that what happens in the sample is a tendency sufficiently coherent with the hypothetical idea of reality to be sufficiently isomorphic is by demonstrating, under rational critique, that what is actually shown is a tendency valid to be a sufficiently true hypothesis—thereby granting critical validity to the empirical hypothesis to be rational, within the limits of science. ***The limit separating the rational from the irrational is the reason itself*** [seventh phase, emotional intelligence is done, we think that achieving this level, Gaia is self aware] : ***everything within the rational is accepted; everything else is rejected***. Beyond science, any knowledge can only be metaphysics; therefore any ground of truth can only be provisionally objective.

8.8.1.12. If the sample's tendency, to validate the empirical hypothesis, both at the individual and sample level, is sufficiently coherent logically with a critical ratio, the *empirical hypothesis will be accepted and transformed into a rational hypothesis* [second stage of Artificial Research by Deduction]. For this reason the sample's tendency must prove sufficient for rational critique to accept that the sample's tendency is sufficient to be generalized and to extrapolate the hypothesis to the entire

universe. Science's rational acceptance entails the inference that the tendency observed—hence empirical—in the sample, both at the individual and sample level, is sufficient to be a provisional ***explanation*** of the universe, in a dialectical process wherein the object of inference is the construction-for-itself of provisional universes. In the dialectical relation between the universal and the provisional, every hypothesis accepted to explain what happens will be a provisional universal explanation. Scientific inference—universal and provisional—is established by accepting hypotheses, deduced from empirical premises, that provisionally have universal validity, insofar as they prove to be sufficiently explanatory and comprehensive to carry out the inference from particular samples—so that, by means of sufficiently representative samples that display rational tendencies according to the hypothesis and critical reason, the goal of explaining and understanding the universe is achieved—transforming ideas, subjective in origin, whenever they are sufficiently rational, into true empirical and rational hypotheses, acquiring provisionally universal value in logical explanation. The universal and the provisional are identical because they are opposites, within the margin of error that scientific policy is willing to accept in the critique of reality—what objectively happens in consciousness.

8.8.1.13. Normally, to say that the empirical tendency lies within the percentage of error accepted by critical reason will mean that the critique of the empirical tendency of rational sufficiency—established in the critical probability—is a critical contrast whose result is zero or positive; therefore the sufficiency of the hypothesis is accepted, and it becomes a provisional universal explanation, provided the result of rational critique is accepted, such that it will possess explanatory reliability of the tendency. The *universe's tendency* [astro ecology] will be inferred from what happens sufficiently and rationally in the sample, both at the individual and sample level.

8.8.1.14. If in the critical contrast between critical reason and empirical tendency the result is acceptable, the tendency of what happens under the hypothesis will be accepted, becoming a tendency that transcends the sample to be a rational explanation of the universe provisionally—the hypothesis thereby becoming a maxim at once universal and provisional.

8.8.1.15. The empirical hypothesis—the idea in itself—transforms, transcending the limits of the sample to be extrapolated, generalized, and transformed into a provisional universal explanation, at the moment when the tendency of a representative sample is sufficient to accept the empirical hypothesis, insofar as it is a sufficient tendency when accepted by the critical reason of scientific policy—whereupon the hypothesis comes to form part of rational knowledge, objective science: the true political theory of what truly happens or is—the *being-in-itself* of real reality—the rational construction of what the universe ought to be, morally: *rational truth* [first stage of the Modelling System, database of rational hypotheses, in the second stage the Modelling System makes models, third stage decisions].

8.8.1.16. The provisional universal tendency, in this way, is that tendency which has been inferred from the sample tendency that has been accepted as sufficiently rational and critical.

8.8.1.17. Science will provisionally accept an isomorphic idea of a given quality of the universe—a true rational hypothesis, universal and provisional—derived from statistical inference, and for as long as the logical or moral incoherence accepted by scientific policy is only a possible source of endless contradictions within science.

8.8.1.18. The *tendency of the universe* [astro ecology is foundation of Gaia] is to be explained by critical reason.

8.8.1.19. Every rational explanation, being framed by error margins, is provisional knowledge. Any knowledge accepted within a possible margin of error—over a necessary, sufficient, or infinite time—is real. All our knowledge about the tendency of the real universe is knowledge limited by our margin of error; hence the capacity for universal isomorphism is limited by humanity's finite explanation or understanding. Contradictions in science faithfully reflect the contradictory nature of humanity, which knows only by accepting errors of fact—parts of reality, samples, contradictions of reality itself. There are two hypotheses: either science is contradictory because the human being is incoherent, or science is contradictory because reality itself is in itself contradictory or incoherent. Both answers inevitably lead to *Hegel*.

8.8.1.20. A universe truly of infinite qualities cannot be known absolutely by a finite being; the infinite cannot fit within the finite. A finite being can only attain partially complete knowledge, but never absolutely complete knowledge, because accepting knowledge of samples of space-time implies knowing only a part of space-time. If only part of space-time is known, it is not a completely complete knowledge of space-time; it is incomplete—or only partially complete. Every rational acceptance of the partially complete implies accepting that when a reality is shown that was not included in the partially complete proposition, incoherence will arise. Therefore, to provisionally accept something partially complete will imply accepting that, in sufficient or necessary time—rational or infinite time—when the inevitable moment comes, the partially complete will turn incoherent, generating logical contradiction and producing random incoherences, ceasing to be part of objective reality. Everything apparently complete will only be partially true until the incoherence produced by the subjectivity of science is empirically evidenced; the reliable appearance of science is the margin of error that political theory accepts.

8.8.1.21. The contradiction between human finitude and infinity is the origin of error, insofar as a finite being cannot know everything completely. The human being does not know the absolute *in itself*; he knows only partially *in itself*—only parts of reality can be known. All partial, sample-based knowledge is only partially complete because it cannot know the absolute. The acceptance of incomplete truths—not completely true—will, in rational or necessary time, be incoherent, contradictory. At the same time, everything possibly, partially coherent, in an infinite universe, will be inevitably provisional. Beyond the provisional time, science will be the eternal becoming of contradictions and ***revolutions—scientific, technological, or paradigmatic***—or both at once; every scientific revolution is ***potentially social***, provided consciousness is socially mediated.

8.8.2. **The quantitative tendency of the universe**

8.8.2.1. The theoretically universal magnitude is inversely proportional to the magnitude of the universe.

8.8.2.2. As N increases, in universes of infinite subjects or options, empirical probability will tend toward zero; the normal Bias Levels of a subject or option and the normal Similarity Levels of a subject or option will tend toward zero; as N increases, the Mean or Standard Deviation will tend toward zero. The more subjects or options there are in an infinite universe, the greater the tendency of subjects or options toward zero. But likewise, if the number of options can increase in universes of limited options [discrete categories, for instance, transformation of factors into discrete categories in conceptual database], the same will happen: as the N limited options could increase, everything would tend toward zero. In a two-option model the theoretical probability is 0.5; in a three-option model the theoretical probability is 0.333... (repeating); in a four-option model the theoretical probability is 0.25; in a ten-option model the theoretical probability is 0.1; and as the options of the model increase, in universes of limited options, one observes an increase in the tendency of all probabilities toward zero.

8.8.2.2.1. Thus, as the N limited options increase in universes of limited options, the tendency of sample behaviour is similar to what happens in universes of infinite subjects or options: as N tends to infinity, everything will tend toward zero.

8.8.2.2.2. But insofar as they are universes of limited options—even if N may tend to infinity—the other variable on which theoretical dispersion and the probability of sampling representativeness error will depend is the inversion of the raw scores or frequencies, in that not only will N's tending to infinity matter; the very tendency to increase that can be observed in the sample of raw scores or frequencies itself will also matter.

8.8.2.2.3. In universes of limited options, the study of theoretical dispersion can be somewhat more complex than in universes of infinite subjects or options, insofar as there may be studies in which—despite being universes of limited options—N is not constant, being a variable magnitude. In democratic elections, the number N of candidates or delegates may vary; the same number of candidates or delegates need not present themselves every year. In the study of discrete categories, the magnitude N of discrete categories will depend on the number of categories into which scientific policy decides to subdivide the magnitude.

8.8.2.2.4. A universe of limited options is one in which what is studied is the distribution of frequencies over certain specified options.

8.8.2.2.4.1. If one studies the distribution of heads or tails in a coin, the distribution of women and men in a society, or the positive or negative outcome of a medicine in a sample of patients, what is being studied is the distribution of frequencies across a set of options—heads or tails; categories—female or male gender; or possible results—positive or negative. In every case, what is distributed are frequencies among a set of options, categories, or outcomes which, in generic synthesis, are called the possible options over which frequency is distributed.

8.8.2.2.4.2. If one carries out a study of discrete categories and a given magnitude is distributed over N discrete categories, what is done is to distribute the frequency of each category in the sample, so that the empirical probability of each category is the relative frequency of that category, insofar as it is the option for the study of frequency. Although, as is again mentioned, discrete-category models—according to what scientific policy establishes—may, under certain circumstances, be studied as a universe of infinite subjects or options.

8.8.2.2.5. Insofar as, in universes of limited options, what is measured is the distribution of frequency across the options, the variables on which theoretical dispersion will depend are the sample of raw scores or frequencies and the variable N, whenever N is variable.

8.8.2.3. As N decreases—in universes of infinite subjects or options, and in those universes of limited options where N is variable—normally empirical probability will tend to increase; the normal Bias Levels of a subject or option and the normal Similarity Levels of a subject or option will tend to increase; as N decreases, the Mean or Standard Deviation will tend to increase—the paradigmatic model, in universes of limited options, being the two-option model—unless the sample of raw scores or frequencies increases enough to offset the decrease in predetermined options.

8.8.2.4. As N increases, normally the probability of theoretical bias decreases; in equal proportion, empirical bias decreases. Therefore, as N increases, the probability of theoretical randomness decreases as the probability of empirical bias decreases.

8.8.2.5. As N decreases, normally the probability of theoretical bias increases; in equal proportion, empirical bias increases. Therefore, as N decreases, the probability of theoretical randomness increases as the probability of empirical bias increases.

8.8.2.6. Universal tendency is, theoretically, inversely proportional to the universe.

8.8.2.7. What happens in the tendency of the empirical hypothesis will be an empirical tendency within what happens in the universe—and what happens in the universe is, theoretically, inversely proportional to the universe itself. Even so, we never know the universe in itself; it is only possible to know that part—the sample—of the universe that, outside itself, shows its being-in-itself, thereby making it possible for science to achieve, for-itself, a partial identity between idea and reality—over the sample—accepting as a matter of fact the error of the reciprocal of the sample.

8.8.2.8. In universes limited to options, the inversion of N—besides being the arithmetic mean and the theoretical probability at random—if N tends to be limited to two options, will be the greatest empirical dispersion: the largest possible Mean or Standard Deviation. And in those limited-option models that tend to increase the options, if N is variable, as the increase in options tends toward an infinite universe, the inversion of N will tend to be theoretical dispersion. Likewise, as will be explained in section ten, in universes limited to discrete categories, the inversion of N will be the probability of representativeness error for the discrete categories—hence it is said to be a model of universe which, though initially one of limited options (discrete categories), can behave like a model of infinite subjects or options.

8.9. **The tendency of the infinite**

8.9.1. The human being, insofar as a finite being, cannot know the infinite singular particular qualities of the universe—or of the possible infinite histories of the universe, or of the infinite parallel universes, or of the possible infinite succession of stages of expansion and contraction of matter successively generating infinite universes. Whatever the cosmological theory of the universe may be, what is certain is that the infinite is a theoretical hypothesis; and the infinite does not fit within a finite form. Moreover, even if it wishes, humanity cannot be everything it wants to be—only, at most, what it can be according to its capacity or scientific-technological progress and in line

with its scientific policy [something that we can change now with the new Cyborg Revolution, and the new Artificial Intelligence Revolution].

8.9.2. The human being lives in a universe of infinite singular particular qualities that cannot be known absolutely in empirical terms—at most intuited; in any case demonstrated mathematically, incoherently or incompletely. In any case, what it *wants* is to know: it is no longer the Kantian moral contradiction between being and ought-to-be; it is the vitalist contradiction between what is and what one wants to be—a rational being capable of understanding at least what happens in order to guarantee survival amid uncertainty [this survival capacity now is embodied by the Cyborg technology and GAI]; the development of explanatory and interpretive capacities for the dialectical *transformation* of reality, albeit partially. The human being cannot know reality in itself; it knows only what reality shows of itself, and what the human being assimilates for itself—accepting a margin of skepticism and uncertainty, a margin of nihilism in which possibly nothing is certain and all causal attribution is a product of habit; a margin of nihilism that critical reason overcomes in the form of political will to progress toward the moral ideals of political ideology.

8.9.3. The contradiction of the finite being that wants to know the infinite—the vital contradiction between being and wanting-to-be—is the origin of error, and is definitive of the human condition [something that can be modified through post-humanism]; it becomes a moral contradiction when, if the moral were solely to affirm the truth and only the truth, science can only aspire to a relative or partial moral truth. The political truth of science is that science is political; the ideology of science is the ideology of reliability in scientific progress toward the ideals of political ideology—of a human being who, beyond limitations, wants to know everything and, being conscious that not everything can be known, accepts political and ideological margins of uncertainty, margins of ignorance and nihilism in which possibly everything and absolutely everything is refutable, hence nothing and absolutely nothing is true. A margin of empirical skepticism and rational doubt—human beings accept critical reason; critical rationalism becomes the only way to resolve the antinomy by overcoming it in dialectic: praxis.

8.9.4. Knowledge is political because it is contradictory. Truth is not one-dimensional; it is dialectical.

8.9.5. Human limitation makes it impossible for the human being to know the infinite; therefore knowledge is incomplete, not absolute—partial. Hence, when the moment of truth arrives, it is incoherent, contradictory—it is a political knowledge of reality, given that it must accept margins of error or ignorance, because in fact it does not know absolutely what happens. A margin of nihilism in which possibly nothing is true, and science is pure ideology—the ideology of reliability within a margin of contradictions. The origin of the incoherence or error of knowledge is human subjective incoherence itself—human physiology.

8.9.6. Since it cannot know absolutely everything in infinite reality, the human being attains only partial, sample-based knowledge. Partial knowledge of the tendency of the infinite in the sample will be universal only insofar as the sample—that part of the universe selected from the infinite—is sufficiently representative. Since the sample is only sufficiently representative, but not absolutely representative, a sample is not the whole in itself. From a partial sample of reality, only universal maxims that are *partially* true can be deduced—the true logical cause of incoherence or contradiction among different theories in science.

8.9.7. Sample knowledge of reality is partial knowledge of reality.

8.9.8. The human being can only partially know the universe—only parts of the infinite. The parts of the infinite that the human being knows are the samples of infinite reality that it selects: that part of the absolute infinite that can be known.

8.9.9. The human being lacks direct access to truth; morally, it knows only parts—samples of space-time. The origin of critical reason lies in the need to study the sufficiency of the tendency of the sample, for which the sample must be sufficiently representative.

8.9.10. The true contradiction in establishing the tendency of the universe—in universes of infinite subjects or options—is not the universe's own tendency to be or not to be infinite, nor that the inversion of N be equal to or less than a critical probability

of error margin one is willing to accept. The origin of error in statistical inference is that if an infinite universe shows a tendency of *everything* toward zero—inversion of N equals zero, empirical probabilities equal zero, Bias Levels equal zero—then to establish an inference from a sample to the universe, on the basis of a hypothetical tendency whose inversion of N in the sample is different from zero, is to posit a hypothetical sample tendency that is not isomorphic to the true tendency toward zero of the infinite universe. It is, in any case, a sample-based knowledge subject to a possible margin of error, where science accepts the hypothetical sample tendency different from zero when, in reality, in the infinite, everything and absolutely everything equals zero—because, in the infinite, nothing is everything, and everything is nothing. Any isomorphism of the infinite is an appearance; in any case, so long as it is reliable, it will be a *logically reliable appearance*—in any case, a product of scientific ideology, the apparent reliability of science.

8.9.11. The contradiction between inferring a universally infinite tendency—in a truly infinite universe—from a sample tendency implies accepting the dialectical contradiction that a universally infinite behaviour can be inferred from a sample when the sample's tendency has a inversion of N different from zero, and the tendency of the true infinite is for everything to be zero. The contradiction between inferring from a sample different from zero to explain an infinite equal to zero is the mathematical expression of the contradiction whereby a finite being wants to know—morally, truly—a truly infinite reality. This contradiction entails accepting errors in a knowledge which, when the moment of truth arrives, can only be incomplete or incoherent.

8.9.12. If a hypothesis inferred from a sample to explain the universe is supposed to be an isomorphic hypothesis to that universe—one that reflects the nature of that universe—it is evident that if, as the universe tends to infinity, the reciprocal of N tends to zero, and the sample, not being infinite, does not tend to a reciprocal of N equal to zero, then it is logically contradictory to accept as isomorphic—as reflective—a hypothesis about a sample whose reciprocal-of-N behaviour is not isomorphic to zero. The sample's reciprocal of N does not reflect the zero of the infinite, the zero of the inversion of N of the infinite universe. That contradiction is, in essence, the clearest, most distinct expression of the very contradiction between finite human condition and

infinite reality. Scientific inference is said to be morally isomorphic, a reflection of real behaviour, when in fact a part—the sample—however representative it may be of that whole (universe), can never be logically identical to that whole absolutely, beyond the margin of error one is willing to accept. Only dialectically is the part identical to the whole—on the dialectically necessary error, the logical error of the identity of opposites: the identity between the sample and the infinite, the part and the whole, the idea and reality, the objective and the subjective, the quantitative and the qualitative, being-in-itself and outside-itself—the infinite nothingness; in any case, for-itself, ideological or moral knowledge—in any case, political.

8.9.13. The idea represents reality within the margin of error one is willing to accept. A quantitative magnitude is identical to the qualitative quality within the margin of error one is willing to accept—the logical error of the identity of opposites. The positive and the negative are identical—within the margin of error to be accepted—in the negation of the negation. The empirical hypothesis will be identical to the moral behaviour of the infinite within the margin of error one is willing to accept. The whole and the part are identical because they are opposites; the whole and the part will be identical within the margin of error one is willing to accept. Every scientific inference about what happens in a whole from what happens in a part will be a scientific inference within a margin of error—causal indeterminism or existential doubt; in any case, chance one is willing to accept.

8.9.14. The whole and nothing are identical because they are opposites in the infinite. The inversion of N in the infinite is zero, because in the infinite the whole—the universe—and its behavior, the inversion of N, is zero: nothing. The quantitative value of nothing in mathematics is zero. If the theoretical behavior of the whole in the infinite is probability zero—Impossible Probability—then nothingness is the behavior of the infinite whole, because everything and nothing are identical insofar as they are opposites. In the infinite, everything and nothing are identical within the margin of error—ignorance—we are willing to accept: inversion of N equals zero, a possible zero error that the human being, being limited, cannot come to know—at most to approach—utopia.

8.9.15. Whole, part, and nothing are three logical moments of the same infinite dialectical process, because in the infinite the whole is nothing and nothing is the whole; because a part of the infinite whole is practically nothing [like a drop of rain in the ocean], and upon that part which is nothing compared to the infinite—so long as it is representative—it is a part identical to the whole insofar as it dialectically represents that whole, within the margin of error one is willing to accept.

8.9.16. The universe and the sample are identical because they are opposites; the universe and the sample will be identical within the margin of error one is willing to accept. The tendency of the sample will be identical to the tendency of the universe within the margin of error—empirical skepticism or rational doubt—moral responsibility or the practical reason of critical reason.

8.10. **Synthesis of the statistics of tendency in the Second Method of Impossible Probability**

8.10.1. **Statistics of individual tendency**

8.10.1.1. **Statistics of empirical individual tendency**

8.10.1.1.1. Maximum empirical probability, *the maximum*: that subject or option which has the greatest empirical probability in the sample; its symbol will be “p(xi+)”.

p(xi+) = maximum empirical probability, *the maximum*

8.10.1.1.2. Minimum empirical probability, *the minimum*: that subject or option which has the smallest empirical probability in the sample; its symbol will be “p(xi-)”.

p(xi-) = minimum empirical probability, *the minimum*

8.10.1.1.3. Empirical probability closest to the inversion of N, *the closest*: that empirical probability whose Bias Level and Similarity Level are closest to zero in the entire sample; it will be denoted "p(xi≈)".

p(xi≈) = closest empirical probability, *the closest*

8.10.1.1.4. Intermediate empirical probability, *the intermediate*: the mean of the maximum and the minimum—divide by two the sum of the maximum and minimum empirical probabilities; it will be denoted "p(xi+/-)".

p(xi+/-) = intermediate empirical probability, *the intermediate*

8.10.1.1.5. In essence, it must be said that the empirical probability of any given subject or option is, *for itself*, the individual empirical tendency of that subject or option. Within the individual statistics, one must also include any empirical probability of a given subject or option in the same sample for which, for whatever reason, one wishes to know its relative descriptive statistic—the dispersion that any subject or option in the sample may have with respect to the entire sample—this given empirical probability being denoted by the symbol "p(xn)".

p(xn) = empirical probability of a given subject or option

8.10.1.2. **Statistics of theoretical individual tendency**

8.10.1.2.1. The arithmetic mean is a theoretical individual tendency because, under normal conditions, every subject or option will tend toward the arithmetic mean; and it turns out that the arithmetic mean is the inversion of N, 1/N—the first function that the

inversion of N acquires, within its multifunctionality in Impossible Probability, for any kind of universe, whether of infinite subjects or options or of limited options.

8.10.1.2.2. The theoretical probability of occurrence under equality of opportunity at random: the inversion of N, 1/N, would be a statistic of theoretical individual tendency insofar as the inversion of N is the probability that every subject or option ought to have in the absence of bias under equality of opportunity—the probability that, absent bias, every subject or option has the same chance of occurring, the probability that any event may occur under equal conditions by chance. In that sense it is an individual probability: the inversion of N is the theoretical individual probability that every subject or option ought to have by chance—chance being free will under equality of opportunity—in any kind of universe, whether of infinite subjects or options or of limited options.

8.10.2. **Statistics of sample tendency**

8.10.2.1. **Statistics of empirical sample tendency**

8.10.2.1.1. The probability of empirical dispersion, the Mean or Standard Deviation.

8.10.2.1.1.1. The differential of probabilities is, dialectically, the differential probability. If the differential of probabilities is the differential probability, then the normal bias of probabilities is the probability of normal bias. If the greater the bias, the greater the differences in the sample, then the probability of differences in the sample is empirical sample dispersion itself. If the smaller the bias, the smaller the differences in the sample, then the probability of differences in the sample will be the empirical differential probability itself—Mean or Standard Deviation.

8.10.2.1.1.2. Mean Deviation is the Average Bias Level by chance.

8.10.2.1.1.3. The normal Bias Level is the expression of the differential score in the Second Method: empirical probability minus theoretical probability.

8.10.2.1.1.4. The normal Bias Level measures individual bias: that by which, empirically, the subject or option does not behave exactly like the inversion of N. It singularly characterizes the universal particular—the differential quality that distinguishes it in the sample, and thus in the universe, infinite or limited—and gives it

its own identity: the difference of the *for-itself* with respect to what is *outside-itself*; being-for-itself identical to itself—the quantitative expression of the difference in the quality of being.

8.10.2.1.1.5. The average of the absolute values of the normal Bias Levels is the Mean Deviation; that is, Mean Deviation is the average of qualitative differences, the average of the normal Bias Level—the average of the differential quality. The Variance is the average of the squared Bias Level. The square root of the average of the squared Bias Levels is the Standard Deviation. The symbol "DMoS" indicates that, for a calculation, one may choose Mean Deviation or Standard Deviation, as scientific policy decides—both being, in any case and in their specific way, empirical oscillation error around the central tendency: in one case in mean form, and in the other in standard form.

8.10.2.1.1.6. The difference of probabilities is the differential probability: the average of the differential probabilities is the average probability of dispersion of probabilities; the average probability of dispersion of probabilities is the average of the Bias Levels.

8.10.2.1.1.7. In the event that, for whatever reason, it were absolutely necessary to compute Variance and Standard Deviation in order to make Impossible Probability commensurable with typical mathematical propositions, adapt the contrasts to those needs.

8.10.2.1.1.7.1. Instead of critical probability and Mean Deviation, contrast the Variance against the percentage X—of error or reliability—over one hundred—relative to the Maximum Theoretical Possible Variance.

8.10.2.1.1.7.2. Instead of contrasting critical probability and Mean Deviation, contrast Standard Deviation and critical probability.

8.10.2.2. **Statistics of theoretical sample tendency**

8.10.2.2.1. The statistics of theoretical sample tendency will, universally, be statistics derived from the inversion of the sample and the critical ratio that scientific policy decides for the rational critique of dispersion—whether individual or sample.

8.10.2.2.2. The inversion of N, 1/N, will be a statistic of theoretical sample tendency in universes of infinite subjects or options, insofar as it is the probability of theoretical bias

and the probability of sampling representativeness error—hence the random bias margin or theoretical oscillation error around the central tendency.

8.10.2.2.3. The inversion of the raw scores or frequencies, $1/\sum x_i$, will be the statistic of theoretical sample tendency in universes of limited options, insofar as it is the probability of theoretical bias and the probability of sampling representativeness error. Only if a limited universe tends to become an infinite universe [discrete categories] would the inversion of N be the probability of dispersion—if the options tend toward infinity. Conversely, if a limited universe tends to be limited to two options, the Mean or Standard Deviation can never be greater than the inversion of N when N is only two options. In universes of limited options, normally the inversion of the raw scores or frequencies will be the random bias margin, or the theoretical oscillation error around the central tendency.

8.10.2.2.4. Critical probability will be a statistic of theoretical tendency, as the critical margin of error or reliability of scientific policy: in contrasts of ideas, a hypothesis is accepted or rejected depending on whether dispersion—be it individual (for example, in Validity) or sample-level (in Critical Sample Level)—is equal to or less than the critical probability in studies of error, or equal to or greater than the critical probability in studies of reliability.

8.10.2.2.5. Within the statistics of theoretical tendency one could include the statistics of maximal tendency, namely: Maximum Theoretical Possible Bias, Maximum Possible Negative Bias, Maximum Possible Empirical Bias, Maximum Theoretical Possible Mean Deviation, Maximum Theoretical Possible Variance, and Maximum Theoretical Possible Standard Deviation—though the explanation of these maximal-tendency statistics is reserved for section 11, devoted to critical reason, where the different models of critical reason will be presented according to the modes of rational critique.

8.10.2.2.6. Likewise, when the omega models are explained, *ideal probability* will be addressed—which should be included among the individual statistics in that kind of model—together with Ideal Mean Deviation and Ideal Standard Deviation.

8.11. **Synthesis of statistical tendency**

8.11.1. Tendency is a form of behavior—a way of being. The ideal way of being is the tendency toward what ought morally to be true within critical reason: under equality of opportunity it should be the inversion of N; under positive bias it should be greater than the inversion of N; under negative bias it should be less than the inversion of N; and in omega models, it should tend to the ideal probability. Critical reason will decide when the tendency of being toward the ought-to-be is morally sufficient; morality is ideological.

8.11.2. Every quality, insofar as it is quantitative, is mathematical—and insofar as it is mathematical, it can be studied mathematically.

8.11.3. The tendency of an event can be studied in the derivative, the slope, the graph; and, in probability, one can make predictions in the study of possible tendencies.

8.11.4. One possible tendency is the maximum possibility; another possible tendency is the minimum possibility; another possible tendency is the intermediate tendency between maximum and minimum; another possible tendency is that described by the subject or option closest to the inversion of N; another possible tendency is the theoretical probability; or a possible tendency is the possible tendency of a given subject or option in its empirical probability; another possible tendency is the tendency determined by the critical probability; or else the tendency determined by individual bias; or the empirical or theoretical dispersion tendency of the sample. All are possible tendencies, and they are possible tendencies of the universe, whether limited or infinite.

8.11.5. The tendencies of a subject or option can be empirical. For example, a maximum or minimum tendency is empirical—it is, empirically, the maximum or minimum tendency of a subject or option; likewise the intermediate tendency between the maximum and the minimum. The empirical tendency of the subject or option closest to the theoretical probability is an empirical tendency; all of these are empirical tendencies of a subject or option—individual tendencies—and, of course, there is what is an individual empirical tendency: the individual empirical tendency of each empirical probability to tend, by itself, according to its free will.

8.11.6. There also exist theoretical individual tendencies: the theoretical individual tendency is the inversion of N, which is the universal theoretical individual tendency of free will under equality of opportunity, as well as the arithmetic mean.

8.11.7. At the sample level, sample statistics are established, which can likewise be empirical or theoretical, wherein the universal theoretical statistic will be the inversion of the sample: in universes of infinite subjects or options, the inversion of sample N; in universes of limited options, the inversion of the sample of raw scores or frequencies. In any case, the inversion of the sample, as a theoretical sample statistic, is the probability of sample dispersion or deviation—the theoretical random bias—and the probability of sampling representativeness error, i.e., the theoretical normal oscillation error around the central tendency.

8.11.8. At the sample level, the empirical statistics will be the probability of empirical sample dispersion; at the individual level, the Bias Level. At the sample level, Mean Deviation—the average of the normal Bias Level—by chance; and one may also establish, in order to make Impossible Probability compatible with the First Method, the Variance and Standard Deviation. In any case, in Impossible Probability the concept DMoS (Mean or Standard Deviation) is standardized, such that, in a given situation, scientific policy may choose Mean Deviation or Standard Deviation.

8.11.9. Contrasting the Bias Levels—individual statistics—against critical probability would indicate the Validity (of equality) or Bias (positive or negative) of tendencies in individual behavior. And at the sample level, the contrast between the probability of empirical sample dispersion and critical probability—the Critical Sample Level of Equality or Bias—would show the sufficiency of the sample's behavior. Individual and sample contrasts must be complementary. A sample contrast that lacks awareness of individual tendency may issue incorrect moral judgments by taking as true possible tendencies that do not correspond to individual reality—for example, in a study of bias, inferring a universal behavior derived from an increase in bias at the sample level without verifying that it is an increase in positive bias of the ideal subject or option (or ideal subjects or options), or an increase in negative ideal bias in that subject or option (or those subjects or options) in which one intended to increase negative bias. In certain models of equality of opportunity it may seem that simply studying the Critical Sample

Level of Equality would render the Validity of Equality unnecessary; but to avoid errors it will always be advisable to make both modes of study—Validity of Equality and Sample Level—compatible. Likewise, an individual contrast that lacks awareness of the sample tendency may take an individual tendency as true when it may be the product of random error due to sample magnitude—whether the sample N in universes of infinite subjects or options, or the sample of raw scores or frequencies in universes of limited options.

8.12. **Tendency and statistical inference**

8.12.1. Mathematically, the infinite exists, and empirically it should not be dismissed lightly. In fact, defining all the qualities of a given reality would be tremendously difficult, because we do indeed live immersed in a universe of infinite singular qualities.

8.12.2. Every material product of the brain is empirically produced by the brain, in its electrochemical sequences. The existence of *the infinite is an empirical hypothesis insofar as it is a product of the brain*; although there is no empirical proof of the existence of the infinite, nevertheless *the brain, without having direct proofs of the infinite, empirically deduces the hypothesis of the infinite*. The infinite is an empirical hypothesis insofar as it is a hypothesis deduced from empirical premises produced materially by our own physiology, which tells us that the existence of the infinite is empirically possible—although empirically we cannot demonstrate it; we can only demonstrate it in theory, mathematically. That is, the hypothesis of the infinite is simply a theoretical hypothesis.

8.12.3. The empirical hypothesis of the existence of the infinite, derived from the material physiological deductions produced by our brain, cannot be demonstrated empirically—only mathematically—a demonstration that is incomplete, or perhaps inconsistent. Hence it is a hypothesis accepted in theory, but not on empirical rational sufficiency. The infinite is a kind of empirical hypothesis accepted only mathematically in theory, logically accepting a margin of incompleteness in the hypothesis of the infinite—the human existential impossibility of knowing the infinite, since the human being is a finite entity.

8.12.4. **Infinity and the provisionality of knowledge**

8.12.4.1. Mathematically there is the hypothesis that prime numbers are infinite; however, insofar as they are infinite, there is no mathematician who knows all the infinite primes. The fact that it is infinite invalidates the idea that a human being can know the infinite whole; the idea of the infinite implies that we cannot know everything. Opposed to primes being infinite there is an alternative hypothesis: that primes are not really infinite—there is simply such a large number of primes as to be sufficient that we cannot know them in their totality.

8.12.4.2. Mathematically there is the hypothesis that the number pi is an infinite number; but it cannot be demonstrated. There is the alternative hypothesis that perhaps, in reality, the number pi has an end—but only after a decimal sequence sufficiently large that our limited intelligence cannot know it [Superintelligence could resolve this problem].

8.12.4.3. Mathematics is incomplete because, if the human being cannot know absolutely everything, then there is no complete knowledge of reality. Incomplete knowledge of reality generates margins of error—margins of ignorance—which, in rational time, become inevitable error. Error produces incoherences; necessarily, incomplete knowledge ends up producing incoherent knowledge. All knowledge is provisional.

8.12.4.4. Human limitation in the face of reality that is infinite—or sufficiently large as to be impossible to know for a physiologically limited being—is the basis of error. Mathematically there are two hypotheses—empirical insofar as they are a physiological product of brain matter, theoretical insofar as they cannot be resolved empirically but only in theory. Both hypotheses are: either the infinite exists, or there exist dimensions so exceedingly large that we believe them infinite, though perhaps they are not infinite—simply dimensions sufficiently large that limited human rationality cannot know them. Impossible Probability starts from the hypothesis that the infinite does exist: for example, there are infinitely many natural numbers; there are infinitely many integers; for example, the subdivision of the unit is infinite [ending up with an infinite sequence of zeros]; any space-time can be infinitely subdivisible.

8.12.4.5. Impossible Probability starts from the hypothesis that the infinite exists, and it is the contradiction between human finitude and real infinity that is the origin of error—the ignorance about what happens beyond the limits of our knowledge.

8.12.4.6. It is impossible to know absolutely everything; at times, at most, we can only intuit. For Kant, to know absolutely everything is to aim at knowledge of the noumenon; the pretension to know the noumenon only generates error—the *thing-in-itself* is the limit of pure reason.

8.12.4.7. In Impossible Probability, knowledge of the thing-in-itself is dialectical knowledge insofar as the thing-in-itself can be known outside-itself; it is knowable, becoming an idea for the human being—Hegel's overcoming of Kant's antinomy. An overcoming which, in Impossible Probability, has a nuance: it is true, as Hegel suggests, that the thing-in-itself can be known through its outside-itself; but in any case it can only be known partially. Knowledge of the thing-in-itself accepts a margin of error within which the impossibility of knowing the thing-in-itself in its absolute form is recognized—for a human being of finite nature in contradiction with infinite reality. Reality-in-itself can be known—but only partially, never absolutely. This is the genesis of the provisionality of knowledge, refuting appearances in the progress of reason.

8.12.4.8. For Impossible Probability, zero is the boundary between the possible and the impossible—besides zero being, among integers, the boundary between the positive and the negative—and, in the infinite, theoretically the impossible becomes possible. The infinite is that toward which knowledge tends, and human finitude is the limit of possible knowledge: we know only what it is possible for us to know. Beyond possible knowledge there exists the human tendency to come to know: it is the dialectic of knowledge of the provisional universe. In practice, materially, anything that has logical coherence will be inevitable—within the margin of logical or moral incoherence one is willing to accept.

8.12.4.9. To know everything is absolutely impossible for a limited being. At most, we attain only possible knowledge—to know a part, the sample—and the possibility of knowledge is the scientific–technical possibility of accessing at least a sufficiently

representative part—the reliable sample—of the subjects or objects of reality-in-itself, in the progress of reason.

8.12.4.10. To know the absolute completely would imply not only knowing the present and the past; it would imply knowing the future—and, in fact, the future is not known; it is only predicted. But as a form of intuition it is not one hundred percent reliable knowledge; it is possible knowledge of what may happen. Prediction is likewise subject to a margin of error—that is, of empirical skepticism or moral doubt about what may occur.

8.12.4.11. To know absolutely everything, then, is impossible for a finite being. We only tend to know everything, assuming margins of error. Ignorance and our scientific–technical capacities are dialectical, because our scientific–technical capacity implies accepting the error of our scientific–technical capacity, which delimits what it is possible to know [the real reason for building GAI, the possibility to go beyond our human condition]. Our margin of possible knowledge is at the same time our margin of possible error. Perhaps we cannot now know everything about galaxies millions of light-years from our planet; but things that we now coherently believe to be impossible may inevitably become coherent—within the margin of incoherence we are willing to accept. The greater the amount of knowledge, the more error is generated—and the more is known, the greater the amount of knowledge is provisional. Now then, the greater the amount of provisional knowledge, the greater the number of inevitable errors; nevertheless, in sufficient or infinite time, at the same time, the greater the amount of knowledge, the greater the number of logical premises on which to establish new hypotheses—which, although they may be false premises, will produce the necessary *contradictions that will give rise to the next scientific crises that must be resolved in the subsequent scientific revolutions*. *In an exponential growth of science**, the faster scientific revolutions succeed one another—the increase in the accelerated pace at which scientific revolutions occur—there may be, in a possible infinite human history, a starting point of permanent revolution***.

8.12.4.12. Because we cannot know everything, we construct from the universe a sample of particulars, upon which we study quantitatively their singular qualities.

8.12.4.13. The theoretical probability of error according to sampling representativeness is the inversion of the sample, which implies that the possible knowledge obtainable from that sample will be subject to a theoretical margin of error equal to the inversion of the sample—the first margin within which to accept the errors of scientific-policy decisions. The second margin of error is critical reason itself.

8.12.4.14. We can deem sufficient—under rational critique—the tendency of a hypothesis to be true, and transform that rational hypothesis into scientific inference to explain and understand the universe. Within the margin of error it is a rational hypothesis; beyond the margin of error we do not know what may happen beyond a rational time.

8.12.4.15. The sufficient tendency transformed into a rational hypothesis, in the rational critique of validity—the contrast of ideas—will come to form part of provisional knowledge, within the accepted margin of error: the inversion of the sample and critical reason itself.

8.12.4.16. A sample composed of a sample of particulars includes only those particulars and no others; therefore it comprises only the differentials of those particulars and no other possible differentials—that is, the differential cases studied are limited to the differential cases of the sample of particular differentials.

8.12.4.17. Now then, through statistical inference what we have done is to convert—into the rank of provisional moral truth—a hypothesis formed from a sample of differential cases. However, those differential cases may have been sufficiently representative, but not morally absolutely representative, because a sample is not absolutely the whole—at most, perhaps, a morally sufficiently representative part. A sample cannot morally *be* a whole; at most it can morally *represent* it—because the part is the part and the whole is the whole. If sufficiently representative, the sample, as part, may be a morally representative part of the whole, within the morally acceptable margin of error—the inversion of the sample—within which the part will be identical to

the whole; but the part will be identical to the whole only within the morally acceptable margin of sampling representativeness—the inversion of the sample.

8.12.4.18. Each particular, in itself, is identical to itself *because it is different*. Every particular is different from every other particular—in other words, every particular is different; that is, every particular is identical to itself; hence the individual identity of the particular is deduced.

8.12.4.19. If every particular is different, and a universe has more particulars than the sample—inasmuch as the sample is a part of the universe—and we assume that every self-identical particular is different from the other particulars, insofar as it is one and unique, then every particular in the universe is different; and if every particular in the universe is different, this implies that not all particulars of the universe are represented in the sample, because the sample represents only a part of the universe—within the morally acceptable margin of error.

8.12.4.20. The part is the part and the whole is the whole; only within the morally acceptable margin of error—the inversion of the sample—will the part be identical to the whole, insofar as the part will morally represent the whole.

8.12.4.21. A part may possibly be representative of a whole, but never absolutely represent a whole. To be representative implies that this representative part is a significant part of that whole, but morally it will never be that whole absolutely, because the whole is the total whole, and a part is a portion or fraction of the whole; the fraction or portion cannot *be* the whole, because the whole is whole, and the part is the part. The part can possibly be morally representative or significant, but not morally be the whole *in itself* in an absolute way.

8.12.4.22. If the part is only morally representative or significant, that representativeness or significance of the part depends on the different particulars of the sample; but insofar as the sample is only a part of the universe's different particulars, then morally the sample can never represent *all* the different particulars of the universe. Morally, the sample will represent only the different particulars of the sample, but never of the entire universe; morally, the sample will be reliable only within the morally acceptable margin of error, insofar as the sample is large enough that the

particulars of the sample represent the *normal* particulars of that infinite universe. A sample is morally representative insofar as it represents the most normal particular cases of a whole. Morally, a sample is not representative if the sample does not represent the most normal particular cases of that whole. Every sample that represents the normality of a whole is morally a representative sample of the whole.

8.12.4.23. The sample does not represent all the different particulars of the universe; but if at least—i.e., within the margin of error, the inversion of the sample—the sample represents the most normal particulars of the whole, and if from the sample a hypothesis has been inferred as the universe's moral truth, then, at the moment we make that inference—by extrapolating the sample tendency to the universe, by inferring that the sample tendency ought to be universal, insofar as the hypothesis has been accepted by critical reason—it is assumed that the tendency posited in the hypothetical proposition is truly possible. The possibility of moral truth will be directly proportional to the representativeness and significance of the error margins in the scientific-policy decision: the inversion of the sample and critical reason.

8.12.4.24. At the moment we establish the rational hypothesis as the universe's moral truth [rational truth, database of rational hypotheses, is the moral truth]—yet that hypothesis, being based on the sample, did not include all the universe's particular differences; the sample, being only representative, included only the most normal particular differentials—when that sample-limited hypothesis begins to be applied to the entire universe, the time of moral provisionality of the hypothesis will equal the time it takes us to find a single particular differential in the real universe whose identity differs significantly from the sample's normal identity. The sample's normal identity will depend on what the most normal identity was among the subjects or options in the sample, which need not correspond to the identity of all the elements of the universe, since there may be elements of the universe that differ significantly from the sample's normal behavior—elements not included in the sample. When, upon ***applying the hypothesis to the universe, a logical error arises—upon finding a differential that the hypothesis neither explains nor understands, being a differential not included in the sample*** from which the hypothesis was accepted, since that particular difference was not included in the sample (because the sample was limited to the

universe's most normal particular differentials)—then the rational hypothesis, provisionally admitted as the universe's moral truth, will cease to be morally accepted. Every moral truth of the universe representative of a normal sample is provisional—provisional until a particular difference is found that, not having been included in the sample that accepted the moral truth yet belonging to the universe, represents a kind of particular ***difference of the universe that must be included in the model***. At that moment the model's moral truth will cease to be moral and will be rationally rejected. In rationally rejecting a model's moral truth, ***a crisis arises in science***, creating a new problem to be explained: the problem of explaining or understanding that differential (or those differentials) not initially encompassed by the rational hypothesis, and whose *discovery calls the rational hypothesis into question and rejects it. Newton's theory of gravity was universally accepted as true—until Einstein's curved space-time showed that the product of the masses over distance squared is not sufficient to understand or explain gravity in curved space-time. Einstein's theory has been universally accepted, except in those elements questioned by the stochastic reality of quantum physics. Every moral truth of the universe is provisional in the progress of science toward reliable isomorphism.*

8.12.4.25. The universe makes knowledge provisional, because insofar as human knowledge is limited, the human being constructs a sample to select particulars of the universe upon which to establish hypotheses—***until new different cases are found***, **beyond those included in the sample**, *which require new samples and models for those different cases of the universe not initially included in earlier samples or models;* or perhaps even, though included in the early samples, were not deemed representative in those first samples, having insignificant associated probabilities. Everything insignificant is potentially decisive, and everything decisive is potentially insignificant. Everything science believes determines the universe will be potentially rejectable by future science—provided progress at an accelerated pace remains unchanged. Many variables that science now deems insignificant may prove decisive for future science. In a possible infinite history of science, at an ***accelerated pace of scientific revolutions, one may reach a point of permanent revolution*** [Transhumanist Revolution Now]; once that point of permanent revolution in science is reached, the

scientific struggle will cease to be the struggle to *be* the paradigm of science. At that point of permanent revolution, the succession of technologies and paradigms will be a perpetual succession. Science will cease to be a steady state of paradigmatic stability and become an accelerated rhythm in the succession of technological and paradigmatic revolutions; science would evolve into a state of permanent revolution.

9.The sample of raw scores or frequencies

9.1. **Introduction to the sample of raw scores or frequencies**

9.1.1. The raw score is the magnitude of intensity of a particular quality.

9.1.2. Frequency is the magnitude of occurrence of a particular quality.

9.1.3. Raw score and frequency are identical because they are opposites: they are identical because both are magnitudes; they are opposites because the raw score is a magnitude of intensity, while frequency is a magnitude of occurrence. They will be opposites within the margin of error one is willing to accept—the *Sample Sufficiency* of the sample of raw scores or frequencies—especially in universes of limited options, unless the ideal is the sample of zeros.

9.1.4. To accept a sample is in fact to accept an error—that is, to accept a factual error, insofar as accepting a sample is, in fact, accepting the error of sampling representativeness: whether in universes of infinite subjects or options by accepting N, or in universes of limited options by accepting the sample of raw scores or frequencies.

9.1.5. It is said that in universes of limited options the probability of sampling representativeness error is the inversion of the raw scores or frequencies, because in universes of limited options the true sample selection is the sample of raw scores or frequencies.

9.1.6. Given any option, the distribution of that option's frequency in the sample—or in the population, if the entire population is studied (for example, in democratic elections when choosing candidates or delegates)—the frequency of each option is the raw score

of each option, and the empirical probability of each option is the quotient of its raw score or frequency over the sum of raw scores or frequencies.

9.1.7. Insofar as, in universes of limited options, the options are predetermined—on a coin it is predetermined that, unless the coin lands on its edge, the outcome can only be heads or tails; physiologically it is predetermined that a human being can only be man or woman, except in intersex cases; in democratic elections, electoral commissions predetermine candidates or delegates by accepting the candidacies; in a study of discrete categories, the pre-established categories are predetermined by scientific policy in accordance with its political theory of science—inasmuch as the model of options predetermined by the model is a predetermined model of options, a priori pre-established to be constant in the study, the true sample selection is the selection of raw scores or frequencies.

9.1.8. The true sample selection—when tossing a coin and studying the behavior of heads or tails—is the total number of tosses; the true sample selection when studying the distribution of men and women in society is the sample of women and men; the true sample selection in democratic elections is the total number of votes. The true sample in a study of limited options is the sample of raw scores or frequencies.

9.1.9. If, in universes of limited options, the true sample on which the distribution of options is studied is the sample of raw scores or frequencies, then necessarily the true probability of sampling representativeness error in universes of limited options must be the inversion of the raw scores or frequencies, $1/\sum x_i$.

9.1.10. Within models of universes of limited options, the following are distinguished:

9.1.10.1. Models of universes of options that are materially or socially limited [or technologically limited, in the second section of each hemisphere of the matrix]—those models of universes of options which, by their own material or social [or technological] limitation, are true models of universes of options in the strict sense: models that can never be transformed into infinite universes [in technology some devices could be distributed in limited options, but at the same time, devices could belong to universes of infinite objects or subjects measured by raw data, factual hemisphere].

9.1.10.1.1. Models of materially limited universes of options. If we toss a coin into the air, materially the options are limited to heads or tails, unless by error the coin stands on its edge; every human being physiologically can only be male or female, except in intersex genetic cases; every particle can only behave as a wave or as a particle; matter, by thermodynamics, is neither created nor destroyed—it transforms—hence either energy transforms into matter or matter into energy; and the state of matter can only be liquid, gaseous, or solid (apart from intermediate states). The chemical elements that make up absolutely all known nature are the elements of the periodic table; each element of the periodic table is itself an option in which a certain distribution of electrons can occur in reality. An atom is composed, materially, of electrons, protons, and neutrons—which can in turn be subdivided into lower subatomic elements. Matter can be studied from the material limitations within which the natural sciences define it in universally provisional empirical hypotheses—that is, rational ones. Models of materially limited universes of options are those in which, naturally, the magnitude N (number of options) remains constant—at least within the provisional acceptance of the empirical hypotheses that define the magnitude N.

9.1.10.1.2. Models of socially limited universes of options. These are social models whose limits are socially defined on the basis of possible options for the distribution of social frequency. For example, workers may be: skilled, semi-skilled, or unskilled; an economic activity may belong to: the public sector, the private sector, or a mixed public–private activity. The legally recognized business models are generally: public limited company, private limited company, cooperative, sole proprietorship; a person's civil status can only be: single, married, separated, divorced, widowed; the family models legally recognized in the West are: monogamous or single-parent; and socially, a behavior can be defined as moral or immoral according to social ethical patterns. Models of socially limited options are those in which the social magnitude N (of social options) remains constant, since the social sciences define social reality according to universally, provisionally accepted rational empirical hypotheses.

9.1.10.2. Models of universes of options with variable magnitude N. These are limited universes of options whose magnitude N may vary—any models in which, for whatever reason, the number of options can vary. For example, in democratic elections the

number of candidates or delegates may be variable; not every election need present the same number of candidates or delegates; and even where there are two electoral rounds, in the second round the number of candidates or delegates is normally smaller. Another model of a limited universe of options with variable N is any distribution of magnitude into discrete categories: the sample of N discrete categories forms the sample N, which may be a distribution of N discrete categories among the multiple subdivisions of the magnitude in question. As the number of discrete categories increases, the categories become less significant by encompassing proportionally fewer occurrences—therefore exhibiting a lower individual frequency; conversely, if the number of discrete categories is reduced, the categories become less representative by including a greater number of occurrences per category, failing to recognize significant differences among occurrences. Only in models of variable magnitude—since the sample N depends on scientific-policy criteria—if the magnitude N tends to increase (hence the model tends toward zero), scientific policy could treat these universes as if they were universes of infinite subjects or options.

[9.1.10.3. In the matrix, in second section of each hemisphere, categorical or factual, is technology, it should be advisable to understand technological limited universes, whose N could be variable or not, but separated from the first section, natural (material) and social, for instance, a device can be inside our body or outside our body, a device could be charged by satellite, or wireless, or need to be plugged, a device could work by Application or by Deduction, or the device could be a particular application for a particular program, including Cyborgs as particular programs]

9.1.11. In this way, the two models of limited universes are: materially or socially limited models—limited in the strict sense—and models of limited universes with variable magnitude N, which include universes limited to discrete categories [and now we should include technological universes as well, those universes made of our own devices, technological universes could have constant or variable N].

9.1.12. The reason for differentiating between models of options [with constant N] that are materially or socially limited in the strict sense, and models of options limited by variable magnitude N is that, while, for example, a materially limited options model is the periodic table—in the way the frequency of electrons, protons, and neutrons is

distributed among its different elements—or that every photon behaves as wave or particle, this catalogue of options will remain unchanged as long as the empirical hypotheses on which it rests remain in force. The moment there were sufficient grounds for the current periodic table of elements to be increased or reduced by the inclusion or elimination of some element, then the options in which the distribution of electrons, protons, and neutrons may occur in the periodic table would vary to the same extent as modifications are made to the table, depending on whether options or elements are incorporated or eliminated. If the current hypothesis that every photon behaves as a wave or a particle were modified—either refuted or altered in some way, whether by inclusion or elimination of some form of behavior—the options model of photon behavior would be refuted or modified as the supporting hypothesis is refuted or modified. If, for example, it were discovered that in addition to wave and particle photons could have a third or fourth (or more) mode of motion, these new options should be included among the photon's modes of motion. Or if, at a given point in space-time, they behave only as particles, the wave option should be eliminated at that point in space-time; or if they behave only as waves at a point in space-time, the particle option should be eliminated for that point in space-time. The moment that, if we are playing dice, we replace a six-sided dice with a dice of fewer or more faces, the model materially limited to the dice's faces will be modified according to whether the number of faces of the substitute die increases or decreases. In a model of social options, if it is currently accepted as a hypothesis that the dominant family model in the West is the traditional monogamous family, formed by two spouses of opposite sex, or single-parent if only one spouse remains in the family, then at the moment when, due to social changes, other family models are admitted in the West—families formed by same-sex couples [when this book was published very few countries in the world recognised same sex marriage, it is incredible to see how fast global society changes], or the admission of polygamy or polyandry, or the disappearance of the family in favor of new forms of relationships that replace it, as advocated by new "free love" theories—the empirical hypothesis about the predominant family model in the West (monogamous or single-parent) should be modified to include new options in the empirical hypothesis: admitting same-sex couples, or polygamy or polyandry; or all hypotheses about the family would disappear if the family were replaced by other models of social

relationships according to the new free-love theories that prevail. Models limited materially or socially depend on the empirical hypotheses that sustain them, which in turn depend on progress in the natural and social sciences— in the case of the natural sciences, above all, on scientific and technological progress that allows current empirical hypotheses to be refuted and replaced by new ones; and in the case of the social sciences, in addition to ***technological progress***, on historical progress in the adoption of ***new modes of moral and social relations***—a factor which in turn depends equally on societies' ***political evolution and their technological development***. Will abortion, adoption by same-sex couples, in vitro fertilization, sex reassignment for those who desire it, and what future family models will be— as social networks advance and more globally extended virtual networks are created, or what the future family model will be when human cloning is possible—ever be accepted globally in all cultures and societies, or will there always be opposing positions? [this paragraph is really important to understand how any change in any hypothesis can produces changes in categories, in GAI, when a rational hypothesis is transformed into a factor, and as a category, any change in the rational hypothesis will produce a chain reaction in the rational truth and the conceptual database, with replicas in the conceptual scheme, categorical models, and deductive models, in essence, any change in any hypothesis will change the Global Project System, GPS]

9.1.13. In summary, there are two models of universes of limited options [now we should include as well technological universes with N variable or constant]:

9.1.13.1. Models of universes of limited options in the strict sense: those models of universes of materially or socially limited options in which the constancy of magnitude N will depend on the provisional acceptance of the empirical hypotheses by which N is defined. N could only be variable insofar as the empirical hypotheses in which it is defined are rejected by science, such that the magnitude N might increase or decrease, or even disappear. In any case, insofar as the constancy of N depends on scientific acceptance, it will be said that the magnitude N is *provisionally* constant as long as the empirical hypothesis in which it is defined is provisionally, rationally accepted as universal. Only when a hypothesis is rationally rejected would the variable N associated with that hypothesis be rejected, such that N should be redefined in the new

hypothesis—or it could even happen that N disappears if the new hypothesis entails the total negation of N. These will be regarded as models of limited options in the strict sense because N will always be constant—at least provisionally—being able to vary only according to the provisional nature of the scientific hypotheses that shape objective reality [in GAI any change in the magnitude of N in any hypothesis will produce a chain reaction in the GPS].

9.1.13.2. Models of options with variable magnitude N: a magnitude N is said to be variable when N can vary at any moment without the need to reject an empirical hypothesis; hence N is not necessarily defined *a priori* by a particular hypothesis. For example, in democratic elections, electoral commissions' acceptance of candidate or delegate lists to stand for election does not depend on a prior empirical hypothesis—it is a political decision in accordance with current law. The fact that, in a study of discrete categories, frequency is distributed across a set of categories—as options that constrain frequency—will depend on the degree of representativeness and significance that scientific policy demands in the study of reality. Insofar as the variable magnitude N can increase (according to scientific-policy criteria), as N increases the statistical treatment of these universes could be similar to universes of infinite subjects or options, since a tendency toward increasing N could imply a tendency of the whole model toward zero [even if in universes limited to a variable N the universes can be sustained without a rational hypothesis, for instance, how many candidates in a general election, there are some limited universes to a variable N based on rational hypothesis, in GAI any change in the magnitude of N will produce a chain reaction affecting the GPS, the global plan].

9.1.13.3. Universes of limited options in the strict sense are, in a strict sense, of limited options because the magnitude N will be provisionally constant as long as the scientific hypothesis that defines N is rationally, provisionally accepted; whereas universes with variable magnitude N are those in which, without needing to depend on the rejection or acceptance of an empirical hypothesis, the magnitude N can vary to the point that its tendency to grow toward infinity could force one to treat the model as if it were a model of infinite subjects or options—as the model tends toward zero as N increases—even though it was initially one of limited options, thus in practice becoming a universe of

infinite subjects or options [in any case, regardless of the limited universe depends on a constant or variable N, as soon as there is a change in N there is chain reaction in GAI with consequences in the GPS, the global plan].

9.1.13.4. The difference in the statistical treatment of information between models of universes of limited options in the strict sense, and models of universes of limited options with variable magnitude, is that the only models that can behave like universes of infinite subjects or options as variable N increases are the *variable-N* models, in which the variation of N does not depend on the prior rejection of any empirical hypothesis [I keep the paragraph as I wrote it in 2011, when Jose Delgado was still alive, but after GAI, the fourth phase was 2018, so right now in 2025 we can say we are already in the fifth phase, I would rather say that, if not all variable-N models are based on an hypothesis, for instance number of candidates in the next general election in the UK, there are many situations in which a rational hypothesis can develop variable N models, especially in social sciences]

9.1.13.5. At the theoretical level, the theoretical difference between models of limited options in the strict sense and models of limited options with variable magnitude N will depend on the very way N is defined. In materially or socially limited options models, the empirical hypothesis defines N, whereas in universes of options with variable magnitude N, N is defined directly by scientific policy [as I said before, now we think that there are limited models with N as variable based on rational hypothesis].

9.2. Empirical dispersion and N in every universe of limited options

9.2.1. Within universes of limited options there are two models: those universes of limited options whose provisionally constant N is predetermined or defined materially or socially by the empirical hypothesis; and those limited-options models whose variable N is predetermined by scientific policy [or hypothesis as well].

9.2.2. In those models with provisionally constant N, at the moment the hypothesis that defines N is rejected and N may vary, any variation in the magnitude N—by a new provisional definition of N under the newly accepted hypothesis—will be a new N that can produce changes in dispersion because, under normal conditions, as N tends to increase, dispersion will decrease, and as N tends to decrease, dispersion will

increase—unless the decrease in N is offset by a sufficient increase in the sample of raw scores or frequencies. In models with variable magnitude N by scientific-policy decisions [or hypothesis], as N increases dispersion will decrease; as N decreases dispersion will increase—especially if the sample of raw scores or frequencies does not compensate for those variations.

9.2.3. The variable N thus becomes an element that influences the sample's dispersion, whether because the provisionally constant N changes when the previous hypothesis is replaced by a new one, or because the magnitude N is politically [or scientifically] variable and may be increased or decreased.

9.2.4. However, this is not the only way N can influence theoretical dispersion, insofar as there is another factor by which N—in absolutely every model of a universe of limited options—becomes a determining factor of empirical dispersion.

9.2.5. If we make an odd number of coin tosses, there will always be one face of the coin, heads or tails, that has at least one more occurrence than the other face of the coin. This would imply that whenever an odd number of tosses is made, never—absolutely never—could the empirical probability of heads be equal to the empirical probability of tails, since heads or tails would exceed the other by at least one occurrence.

9.2.6. If one studies the frequency of men or women in a social sector, and the selected sample of men and women is an odd number, then necessarily—at a minimum—either there is one more woman than men, or at a minimum there is one more man than women. Therefore, if the sample is an odd number there can never be an equal number of men and women, nor of women and men.

9.2.7. Therefore, if in a sample of heads or tails, male or female, the fact that the sample is odd does not guarantee equality of opportunity, it is because if the total frequency is not a multiple of N, equality of occurrence is not guaranteed.

9.2.8. If we roll a six-sided dice and the sample of rolls is not a multiple of six, then there will always be options that have greater occurrence than the rest of the options.

9.2.9. If, in a study of discrete categories, the total of the frequencies is not a multiple of the N discrete categories into which the magnitude's scale was divided, there will always be at least one category that has greater frequency than the others.

9.2.10. In absolutely every model of a universe of limited options—whether N is defined by empirical hypotheses or N is defined politically—always, and absolutely always, regardless of which model of a universe of limited options it may be, empirical dispersion will not only be a dependent variable of the inversion of the raw scores or frequencies; always, and absolutely always, whenever the total frequency (i.e., the sum of the raw scores or frequencies of all options) is a total frequency that is not a multiple of N, equality of opportunity will not be guaranteed—this being a direct cause of empirical dispersion, however insignificant it may seem as the sample of raw scores or frequencies increases.

9.2.11. Therefore, in every model of universes of limited options, it is not only necessary to control empirical dispersion by means of a inversion of raw scores or frequencies that is equal to or less than the critical ratio (percentage X of error over one hundred); to control empirical dispersion in every possible model of limited options it is absolutely necessary that the magnitude of the sample of raw scores or frequencies—the total frequency—be a multiple of N to guarantee equality of opportunity. Otherwise, empirical dispersion may be, in part, a product of the *shape* of the sample of raw scores or frequencies not being a multiple of N; thus empirical dispersion would not fully reflect real dispersion, being in part a product of sample selection—the total frequency—even if apparently insignificant.

9.3. Just as population studies are integrated into universes of infinite subjects or options whenever a population can be studied scientifically, in universes of limited options there are situations in which the population—as total possible frequency—can be studied completely. For example, in democratic elections, insofar as all adult citizens have the right to vote, what is studied is the distribution of voting frequency in favor of each candidate or delegate, such that the raw score of each candidate or delegate equals the voting frequency in society in favor of that candidate or delegate—

the study then being of the distribution of each candidate's or delegate's bias across the entire society, in which the complete population is integrated.

9.4. A paradigm in universes of limited options is the two-option model. Every possible model, to be stochastic, must have at least two options; if a model contemplates only a single option, then it is not a probability model—it will be a deterministic model concerning the single option considered—but it will not involve probability. To speak of probabilities, N must be at least equal to two; otherwise there is no study of probability—there is a priori determination. The two-option model is also a paradigm because it is that model in which the inversion of N is equal to the greatest possible Mean or Standard Deviation, since, in a two-option model, the most the empirical sample dispersion can tend to is to equal the inversion of N, but absolutely never, in two-option models, can the Mean or Standard Deviation be greater than the reciprocal of N.

N = heads or tails, man or woman, wave or particle = 2

1/(N = 2) = ½ = 0.5 = greatest empirical dispersion in two-option models

9.5. Only in two-option models is the reciprocal of N the greatest possible empirical sample dispersion. In two-option models the reciprocal of N acquires a new value: the greatest possible empirical dispersion for those two options.

9.6. Now then, the fact that in universes of two options the inversion of N acquires one more function—one it has in no other possible model—namely, that the inversion of N equals the greatest possible empirical sample dispersion, does not imply that in universes of two options the inversion of the raw scores or frequencies ceases to be the probability of theoretical dispersion. Since the inversion of N will be the greatest possible empirical dispersion *at the same time* that the objective theoretical dispersion will continue to be equal to the inversion of the raw scores or frequencies in two-option models—just as in any other possible model of limited options.

9.7. The fact that the inversion of N is the greatest empirical sample dispersion in two-option models does not imply that the inversion of the raw scores or frequencies ceases to be the probability of theoretical dispersion—quite the contrary. If the inversion of N is the greatest Mean or Standard Deviation in two-option models, the inversion of N ceases to be objective for studying normal theoretical dispersion; for this reason, normal theoretical dispersion in limited options is the inversion of the raw scores or frequencies.

1/N = greatest possible empirical dispersion only in two-option models or categories

1/∑xi = probability of theoretical dispersion, and probability of representativeness error, for every universe of limited options—including those limited to two options.

9.8. Objectivity in normal theoretical dispersion in universes of limited options, normally

9.8.1. As N tends to be limited, the inversion of N ceases to be objective for measuring normal theoretical dispersion, insofar as, as N tends to be smaller, the inversion of N tends to be larger—surpassing any objective assessment of what normal empirical dispersion ought to be.

9.8.2. The magnitude N is a variable that, in a stochastic model, can have at least two options—to be truly stochastic—and at most tend toward infinity.

9.8.3. As N tends toward infinity, under normal conditions, the universe model behaves like a universe of infinite subjects or options, such that as N tends toward infinity the model tends toward zero [in models based on discrete categories, the larger N is, the smaller the dispersion is].

9.8.4. As N tends toward infinity, empirical probabilities tend toward zero.

9.8.5. As N tends toward infinity, every normal Bias Level tends toward zero.

9.8.6. As N tends toward infinity, the Mean or Standard Deviation tends toward zero.

9.8.7. As N tends toward infinity, the inversion of N tends toward zero.

9.8.8. As N tends toward infinity, sampling representativeness error tends toward zero.

9.8.9. As N tends toward infinity, the probability of theoretical dispersion tends toward zero.

9.8.10. As N tends toward infinity, equality of opportunity by chance tends toward zero.

9.8.11. As N tends toward infinity, under normal conditions, everything tends to become nothing—in the absolute identity of the whole and nothing—since there is zero representativeness error, zero dispersion, everything being equal to nothing: zero.

9.8.12. As N tends toward infinity, theoretical dispersion becomes more stringent for testing empirical dispersion.

9.8.13. As N tends toward zero representativeness error, the model becomes increasingly representative.

9.8.14. Logically and dialectically, as N tends toward infinity, the inversion of N becomes more stringent—reducing the margin within which to accept empirical dispersion by chance and minimizing sampling representativeness error to the greatest extent possible—while, at the same time that it becomes absolutely more stringent, the whole becomes absolutely nothing—logically and dialectically.

9.8.15. And if, as N tends toward infinity, the model tends toward zero, conversely—if the minimum possible number of options is two—as N tends to be limited, tending to be a two-option model, the inversion of N becomes less stringent, less reliable.

9.8.16. If, proportionally, N tends to only two options, the inversion of N tends to increase; then the sampling representativeness error derived from N tends to increase—therefore N is not reliable for critically studying the sample.

9.8.17. If, proportionally, N tends to be only two options, the inversion of N tends to increase; then empirical sample dispersion tends to increase—therefore N ceases to be reliable for critically studying whether empirical dispersion is or is not due to chance.

9.8.18. If, proportionally, N tends to be only two options, behavior tends to differ from the normal—except where the sample of raw scores or frequencies is representative.

Then normal behavior is not guaranteed by the inversion of N, and N ceases to be reliable for the critical study of normality, because as N tends to be limited, the guarantees of normality will depend on the sample of raw scores or frequencies.

9.8.19. If, proportionally, N tends to two options, N loses reliability; then all reliability in the critical study of the options will depend on the sample of raw scores or frequencies—the total frequency.

9.8.20. As N tends to be limited to two options, the true probability of sampling representativeness error is the inversion of the raw scores or frequencies.

9.8.21. As N tends to be limited to two options, the true probability of theoretical dispersion is the inversion of the raw scores or frequencies.

9.8.22. Therefore, as N tends to be limited, N will lose reliability for the critical study of any aspect of the sample; the inversion of the raw scores or frequencies will then be more objective.

9.9. **The universal functions of N**

9.9.1. As N tends to be limited, it loses objectivity for measuring error and theoretical dispersion; as N tends to increase, it gains objectivity for measuring error and theoretical dispersion. The objectivity of N in measuring theoretical error and dispersion is a function inversely proportional to N; therefore the objectivity of the inversion of N, for measuring dispersion and theoretical representativeness error, will depend on the inversion of N being equal to or less than a critical probability as an error margin—*Sample Sufficiency of N*.

9.9.2. However, regardless of whether the magnitude N is reliable for measuring sampling representativeness error and theoretical dispersion, always—and absolutely always—the inversion of N will have the inalienable and universal functions, in every possible model, of being equal to the arithmetic mean and the theoretical probability of occurrence under equality of opportunity.

9.10. **The sample of zeros**

9.10.1. A sample is said to be a sample of zeros when all raw scores or frequencies are equal to zero; therefore the sum of raw scores or frequencies equals zero—zero raw scores or frequencies in the sample—hence, in essence, a sample of zeros.

9.10.2. There are statistical situations in which the ideal may be a sample of zeros—although this type of situation would be more logical in universes of infinite subjects or options than in universes of limited options.

9.10.3. There are study models that require—either from a first measurement or in a second post-experimental measurement, in universes of infinite subjects or options—that all raw scores or frequencies be zero; thus the ideal is the sample of zeros.

9.10.4. If the treatment of a disease is studied by means of a new medicine, and the medicine's effectiveness is studied by examining symptoms per patient—hence a universe of infinite subjects or options—then as symptoms tend to remit, all symptoms per patient will tend to disappear. Therefore, if empirical probability equals a patient's frequency of symptoms over total frequency, then as symptoms tend to remit in each patient, the patients' empirical probability should tend toward zero—a typical model in which, if what is studied is the frequency of non-ideal qualities per subject or option, logically the ideal should be zero non-ideal qualities.

9.10.5. If in an industrial process the aim is to reduce the number of errors per unit produced—again a universe of infinite subjects or options—then, if each unit's empirical probability is the number of errors in that unit over the total sum of errors, the ideal would be that, as errors tend to disappear in the units produced, the sample of empirical probabilities tends to be a sample of empirical probabilities equal to zero.

9.10.6. Therefore, especially in universes of infinite subjects or options, situations may arise where, if the object of study is reducing negative qualities to zero, the study's objectives are proportionally achieved and the model tends to zero non-ideal negative qualities—the sample will be a sample of zeros.

9.10.7. Whereas in a universe of infinite subjects or options one can study the raw score or frequency of non-ideal, negative qualities for each particular subject or option—

hence the ideal would be a sample of empirical probabilities equal to zero—by contrast this kind of model, whose ideal is the sample of zeros, would be exceptional or unusual in models of limited options.

9.10.8. The only possibility, in a study of limited options, that the ideal would be for all options to have empirical probability zero would be if all the model's options were non-ideal or negative options whose magnitude is to be reduced to zero.

9.10.9. Now then, a limited-options model in which absolutely all options are non-ideal options: while such cases could exist—for example, in a study of discrete categories all discrete categories, to a greater or lesser degree, might be non-ideal or negative, so the frequency would tend to be reduced, tending toward zero, in every discrete category, since they are all non-ideal or negative—although a model of absolutely non-ideal options is possible in which all options are equally non-ideal or negative, it must be said that this type of situation would not be the most normal in universes of limited options. Perhaps, insofar as the *Impact of the Defect* is understood as a universe limited to non-ideal discrete categories—that is, non-ideal options—the *Impact of the Defect* model could be interpreted as a case of this type: a universe limited to N non-ideal discrete categories—non-ideal options—of individual defects. But even in such a case, it would not be studied as a limited-options model in the Second Method; it would be studied directly as the *Impact of the Defect* model, as explained later.

9.10.10. In universes of limited options, the ideals may be: the ideal of equality of opportunity; and increasing the positive bias of the ideal option. Increasing the positive bias of the ideal option will then imply ideally increasing the negative bias of the non-ideal options—the increase in negative bias in non-ideal options being an ideal in itself insofar as the non-ideal options tend toward zero. There is also the possibility of omega models.

9.10.11. In any model, scientific policy must always establish the ideals; and if, in universes of limited options, the ideal were to increase the negative bias of the non-ideal options—as categorically non-ideal options, conceptually non-ideal—then, against the non-ideal category or concept, it will always be politically possible to establish which category or concept is morally ideal, whose positive bias is to be

increased. In *Impact of the Defect*, at the same time as studying the reduction of individual defects, one studies the increase in *Individual Effectiveness*.

9.10.12. If the ideal is equality of opportunity, the ideal of equality of opportunity implies that no option is more or less ideal than the others: the very definition of equality of opportunity implies that all options are equally ideal, among which frequency must be distributed equally. For equal options, each option should in theory, in equality, receive the same magnitude of frequency equally. In models of equality of opportunity, the ideal is equal distribution of frequency—the reciprocal of N.

9.10.13. If the ideal, in a limited-options model, is to increase the positive bias of the ideal option (or ideal options), by natural goodness it will imply increasing the negative bias of the non-ideal option (or non-ideal options), insofar as whenever the magnitude of positive bias is increased, the magnitude of negative bias is increased in the same proportion—because, by natural goodness, all positive bias (the sum of all positive Bias Levels) will tend to compensate all negative bias (the sum of the absolute values of all negative Bias Levels).

9.10.14. Insofar as, in a limited-options model, vis-à-vis every non-ideal option there will always be a politically realizable ideal option—as mentioned earlier, in the case of defects the *Impact of the Defect* would be applied directly—and if, in a limited-options model, every increase in negative bias for politically non-ideal options should imply a proportional increase in positive bias for the politically ideal option, then in the case of defects the study of defects and *Individual Effectiveness* should be made compatible, and one should study how the reduction of defects entails an increase in effectiveness. In any case, in the Second Method, by natural goodness, normally all negative bias produced by politically non-ideal options should be compensated by the positive bias of politically ideal options—except in the sample of zeros, insofar as, in a sample of zeros, there is only negative bias: no positive bias will compensate all that negative bias.

9.10.15. Every definition of what is ideal or non-ideal—whether the ideal is an increased tendency to equal distribution of frequency among options (the ideal of equality of opportunity), or the ideal is the increased distribution of frequency in one or several politically determined options (the politically ideal options), reducing the distribution

of frequency in the politically non-ideal option(s)—every definition of what is ideal or non-ideal will be a definition set by scientific policy according to the political theory of science—the political theory of science itself being a dependent variable of ideology.

9.10.16. Thus it may be said: the *sample of zeros* is when, in the entire sample, all empirical probabilities are equal to zero—when the ideal is zero raw score or frequency for all subjects or options.

9.10.17. If the ideal of the sample of zeros were to occur in a universe of limited options, then, insofar as the ideal is the total elimination of all the raw scores or frequencies that make up the definition of N in the hypothesis—or the total elimination of the frequency of the political definition of N—inasmuch as hypothetically or politically N must tend to frequency zero, the political or hypothetical frequency of N itself is a frequency that must be understood as error in itself. Therefore, if the ideal is the sample of zeros—inasmuch as the error in itself is the sample of raw scores or frequencies—what must be studied is the tendency toward zero in raw scores or frequencies; therefore, in samples of zeros, the reciprocal of the raw scores or frequencies does not fulfill the function of probability of sampling representativeness error, since the raw scores or frequencies themselves are error in themselves—whenever the ideal is the sample of zeros.

9.10.18. Therefore, if it happens that—given the ideal is the sample of zeros—the error in itself is the very sample of raw scores or frequencies, then in this type of study the reciprocal of the raw scores or frequencies must not be applied as the probability of sampling representativeness error; the error in itself is the sample of raw scores or frequencies.

9.10.19. In models of universes of infinite subjects or options where the ideal is the sample of zeros, neither the *Critical Normality Requirement* nor the *Normality Requirement* can be applied.

9.10.20. In models of universes of limited options where the ideal is the sample of zeros, under no circumstances can the *Sample Sufficiency* of the reciprocal of the raw scores or frequencies be applied either.

9.10.21. The principal contradiction implied by the sample of zeros is that it reveals a difference between the Second Method and the First Method.

9.10.22. *Impossible Probability* is, in essence, a redefinition of traditional fundamental mathematical concepts.

9.10.23. What, for the First Method, is the arithmetic mean is, in the Second Method, the reciprocal of N—among many other functions

9.10.24. What in the First Method is *relative frequency* is, in the Second Method, *empirical probability*.

9.10.25. What in the First Method is *differential score* is, in the Second Method, *Bias Level*.

9.10.26. Now then, redefining the arithmetic mean as the reciprocal of N entails more than a mere change of name; it entails a full reconceptualization of empirical dispersion.

9.10.27. Whereas in the First Method the differential score is defined as *raw score or frequency minus arithmetic mean*, in the Second Method the Bias Level is defined as *empirical probability minus reciprocal of N*.

9.10.28. It may appear to be a simple change of name, but in reality it is much more than a change of name. It is not only changing *mean* to *reciprocal of N*, or *relative frequency* to *empirical probability*, or *differential score* to *Bias Level*—it is far more than a renaming because of the logical implications.

9.10.29. The first logical implication is as follows. If, in a sample of raw scores or frequencies, it happens that all raw scores or frequencies are zero, then in the First Method the arithmetic mean is zero.

9.10.30. By contrast, in the Second Method, although a sample of zeros yields empirical probabilities that are all equal to zero, the fact that N is different from zero logically implies that the reciprocal of N is different from zero—because, within the multifunctionality of the reciprocal of N in the Second Method, the reciprocal of N is the probability of occurrence at random under equality of opportunity. Therefore, even if the

sample is a sample of zeros, the reciprocal of N is non-zero, which entails a logical contradiction: for a sample of zeros, the "logical" value of the mean would be zero; however, the reciprocal of N—being at once the arithmetic mean of empirical probabilities and a theoretical probability—is non-zero as the theoretical probability of occurrence at random under equality of opportunity.

9.10.31. If, in a sample of zeros, the arithmetic mean is zero in the First Method, then the differential score in the First Method—each zero raw score or frequency minus a zero mean—should be a differential score of zero.

9.10.32. In the Second Method, however, a sample of zeros can be a sample of empirical probabilities equal to zero, but since the reciprocal of N (the theoretical probability of occurrence under equality of opportunity) is non-zero, the Bias Level equals *minus the reciprocal of N*, which is the *Maximum Possible Negative Bias*. Given that Bias Level = empirical probability − theoretical probability; if empirical probability is zero (the *Minimum Possible Empirical Probability*), then the Maximum Possible Negative Bias can only be the absolute value of the reciprocal of N—that is, the reciprocal of N—since $N \neq 0$ implies $1/N \neq 0$, as a theoretical probability, even though all empirical probabilities are zero.

9.10.33. Therefore, while in the First Method a sample of zeros has mean = 0, in the Second Method the reciprocal of $N \neq 0$ whenever $N \neq 0$; and while in the First Method, in a sample of zeros, the differential score is zero (because both the raw scores and the mean are zero), in the Second Method the absolute value of the Bias Level equals the reciprocal of N—the *Maximum Possible Negative Bias*.

9.10.34. Thus, although in theory a sample of zeros "should" have dispersion equal to zero—if truly all raw scores or frequencies are zero, so the arithmetic mean is zero and all differential scores are zero—this supposition holds only in the First Method, where for a sample of zeros the Mean or Standard Deviation can only be zero, a logical property that does not hold in the Second Method.

9.10.35. Because in the Second Method, even if all empirical probabilities are zero, as long as $N \neq 0$ the reciprocal of N is $\neq 0$; therefore, for any N, the absolute value of the Bias Level is 1/N when all empirical probabilities are zero. Hence, in the Second

Method, for samples of zeros the Mean or Standard Deviation equals the reciprocal of N—producing the logical contradiction that, for a sample of zeros, empirical dispersion is not equal to zero, since both at the individual level (Bias Level) and at the sample level (Mean or Standard Deviation), the empirical dispersion of a sample of zeros can only be equal to |1/N|.